PROSPECTIVE STUDY ON PORT SITE COMPLICATIONS IN LAPAROSCOPIC SURGERIES IN GRH,MADURAI

M.S. DEGREE EXAMINATION

BRANCH I - GENERAL SURGERY

DEPARTMENT OF GENERAL SURGERY

MADURAI MEDICAL COLLEGE AND GOVT RAJAJI HOSPITAL

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BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled **" PROSPECTIVE STUDY ON PORT SITE COMPLICATIONS IN LAPAROSCOPIC SURGERIES IN GRH,MADURAI"** is a record work done by **DR.T.D.VARNEIKIP CHIRU.,** under my direct supervision and guidance during the period of october 2016 - september 2017.

This has been submitted in partial fulfillment of the award of M.S., Degree in General Surgery(Branch I) to The Tamil Nadu Dr.M.G.R. Medical University,Chennai-600032

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DECLARATION

I, **Dr.T.D.VARNEIKIP CHIRU** declare that, I carried out this work on "**PROSPECTIVE STUDY ON PORT SITE COMPLICATIONS IN LAPAROSCOPIC SURGERIES IN GRH,MADURAI**" at the Department of General Surgery, Govt. Rajaji Hospital during the period of October 2016 to September 2017. I also declare that this bonafide work or a part of this work was not submitted by me or any others for any award, degree and diploma to any other University, Board either in India or abroad. This is submitted to The Tamil Nadu Dr.M.G.R.Medical University, Chennai in partial fulfillment of the rules and regulations for the M.S. degree examination in General Surgery.

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LIST OF ABBREVIATIONS

Cx-Complication

PSI:Port site infection

PIH-Port site hernia

LI-Laparoscopic instrument

PSM-Port site metastasis

NNIS-National Nosocomial Infections Surveillance

CDC-Centre of Disease Control and Prevention

LIST OF CONTENTS

INTRODUCTION

Minimally invasive surgeries such as laparoscopic surgeries has become the order of the day for many surgical diseases.Laparoscopic surgery is the standard care for many surgical and gynecological conditions with documented benefits and excellent outcome. The main reason for preference of laparoscopic surgeries to abdominal surgeries are the less pain and scarring, faster convalescence and lesser hospital stay. Also more and more surgeries are being performed laparoscopically as a result of advancement in medical science.However a rapid expansion in volume and complexities of laparoscopic surgeries has been accompanied by complications,many of which can be directly attributed to abdominal access with laparoscopic trocars including vascular injuries,visceral injury,air embolism,subcutaneous emphysema,port sites infections,port site incisional hernia and metastasis at the port sites.These complications are by far very rare.The overall rate of major complications following a laparoscopic procedure is approximately 1.4 per 1,000 procedures. However the incidence of port site complications following laparoscopic surgery is considered to be around 21 per 100,000 cases and it has shown a proportional rise with the increase in size of the port site incision and trocar. The overall complications/injuries that occur following laparoscopic surgeries involve gastrointestinal (0.06%), genitourinary (0.03%), vascular (0.01%) and omentum (0.04%).8,9 However, other rare complications include pyoderma gangrenosum, metastasis at the port site following laparoscopic oncosurgery and port site infections (PSIs).

ABSTRACT

BACKGROUND AND OBJECTIVE

Laparoscopic techniques have revolutionized the field of surgery and offer several advantages over laparotomy including lower patient morbidity rates, reduced hospital length of stay and earlier return to normal activities. Although rare,several port site complications have been reported in the literature. Laparoscopic port site complications can be access-related or post-operative.Complications are related to port-site incision size, number of port sites, obesity, and umbilical ports.The objective of this study is to determine the morbidity associated with ports at the site of their insertion in laparoscopic surgery, to identify risk factors for complications and their management.

METHODS

All patients who underwent laparoscopic surgeries, between October 2016 and September 2017, at GRH,Madurai, in the Department of General Surgery,were included in the study after taking a written consent and port sites were monitored for complications . A total of 100 cases were operated upon.Out of 100 cases 45 undergo cholecystectomy,20 had appendectomy, 10 had diagnostic laparoscopy,6 had adhesiolysis,6 had lap APR,and the remaining 3 cases did gastropexy,splenectomy and ligation of testicular vein for varicocole respectively.Wounds were assessed clinically after surgery and in case of infection, were treated with regular cleaning and dressing, with empirical oral antibiotics.PSI was studied in relation to frequency, type of surgery, and port position.

Similarly, port site bleeding, was studied in relation to frequency, site, type of ports, and size of ports.Omentum related complications were studied in relation to frequency, type of surgery, number of ports, and the port site involved. Further port site complications were studied in relation to age, sex, body mass index (BMI), total number of ports used, technique of port closure, and procedure performed.Data collected and analysed by various statistical methods.

RESULT:

Of the 100 patients undergoing laparoscopic surgery, 40% had developed complications specifically related to the port site during a minimum follow-up of one year period; port site discharge (PSD) was the most frequent (n = 14,14%), followed by port site infection (n = 11,11%), bleeding(n=5,5%),PIH(n=6,6%),PSM (n=4,4%) omentum-related complications nil..

CONCLUSION:

Laparoscopic surgeries are associated with minimal port site complications. Complications are related to the increased number of ports. Umbilical port involvement is the commonest. Most complications are manageable with minimal morbidity, and can be further minimized with meticulous surgical technique during entry and exit.

AIM OF THE STUDY

1. The aim of this study is to determine the complications associated with the port site in laparoscopic surgeries

2. To identify the risk factors thereby anticipating complications and suggest timely preventive measures

REVIEW OF LITERATURE

HISTORY:

Although the term minimally invasive surgery is relatively recent, the history of its component parts is nearly 100 years old.What is considered the newest and most popular variety of MIS, laparoscopy, is, in fact, the oldest.Primitive laparoscopy,placing a cystoscope within an inflated abdomen,was first performed by Kelling in 1901.Illumination of the abdomen required hot elements at the tip of the scope and was dangerous. In the late 1950s, Hopkins described the rod lens, a method of transmitting light through a solid quartz rod with no heat and little light loss. Around the same time, thin quartz fibers were discovered to be capable of trapping light internally and conducting it around corners, opening the field of fiber optics and allowing the rapid development of flexible endoscopes.

The field of minimally invasive surgery has experienced an explosive growth in last two decades.The first half of 1980s saw the introduction of technology that helped in fuelling the growth of minimal access surgery to what is today.Kurt Semnj a German Gynaecologist did the first laparoscopic appendicectomy during routine gynaecological procedure in 1983. Basic and advanced laparoscopic surgery is safe but not risk free.Complications tends to occur during the procedure and in the post op recovery period.

Laparoscopy:

Laparoscopy also known as diagnostic laparoscopy,is a surgical procedure used to examine the organs inside the abdomen.Its a low risk,minimally invasive procedure that requires only small incisions.It uses a instrument known as laparoscope to look the abdominal organs.A laparoscope is a long,thin tube with a high intensity light and a high resolution camera at the front.The instrument is inserted through an incision in the abdominal wall.As it moves it moves along,the camera sends images to a video monitor.

The many laparoscopic procedures performed daily range from basic to advanced complexity

Laparoscopic surgical procedures		
BASIC	ADVANCED	
Appendectomy	Nissen fundoplication	Lymph node dissection
Cholecystectomy	Heller myotomy	Robotics
Hernia repair	Gastrectomy	Stereo imaging
	Esophagectomy	Telemedicine
	Enteral access	Laparoscopy-assisted procedures
	Bile duct exploration	Hepatectomy
	Colectomy	Pancreatectomy
	Splenectomy	Prostatectomy
	Adrenalectomy	Hysterectomy
	Nephrectomy	

Fig:1.Basic and advanced laparoscopic surgeries

General Principles of Access

The most natural ports of access for MIS and NOTES are the anatomic portals of entry and exit like the nares, mouth, urethra, and anus.The advantage of using these points of access is that no incision is required but the disadvantages lie in the long distances between the orifice and the region of interest.For NOTES procedures, the vagina may serve as another point of access, entering the abdomen via the posterior cul-de-sac of the pelvis. Similarly, the peritoneal cavity may be reached through the side wall of the stomach or colon.

Access to the vascular system may be accomplished under local anesthesia by cutting down and exposing the desired vessel. Vascular access is also obtained with percutaneous techniques known as Seldinger technique.

In thoracoscopic surgery, the access technique is similar to that used for placement of a chest tube.A small incision is made over the top of a rib and, under direct vision, carried down through the pleura. The lung is collapsed, and a trocar is inserted across the chest wall to allow access with a telescope.Because insufflation of the chest is unnecessary, simple ports that keep the small incisions open are all that is required to allow repeated access to the thorax.

Laparoscopic Access

The requirements for laparoscopy are more involved, because the creation of a pneumoperitoneum requires that instruments of access (trocars) contain valves to maintain abdominal inflation Two methods are used for establishing abdominal access during laparoscopic procedures.The first, **direct puncture laparoscopy**, begins with the elevation of the relaxed abdominal wall with two towel clips or a well-placed hand. A small incision is made in the umbilicus, and a specialized spring-loaded (Veress) needle is placed in the abdominal cavity,two distinct pops are felt as the surgeon passes the needle through the abdominal wall fascia and the peritoneum

Fig:2 Direct access technique/Verees method (Insufflation of the

abdomen using verees needle in direct puncture laparoscopy

The critical issues for safe direct-puncture laparoscopy include the use of a vented stylet for the trocar, or a trocar with a safety shield or dilating tip. The trocar must be pointed away from the sacral promontory and the great vessels.Patient position should be surveyed before trocar placement to ensure a proper trajectory

The second method is **the direct peritoneal access (Hasson) technique**.With this technique, the surgeon makes a small incision just below the umbilicus and under direct vision locates the abdominal fascia. Two Kocher clamps are placed on the fascia, and with curved Mayo scissors, a small incision is made through the fascia and underlying peritoneum. A finger is placed into the abdomen to make sure that there is no adherent bowel.

This technique is preferable for the abdomen of patients who have undergone previous operations in which small bowel may be adherent to the undersurface of the abdominal wound.For safe access to the abdominal cavity, it is critical to visualize all sites of trocar entry.

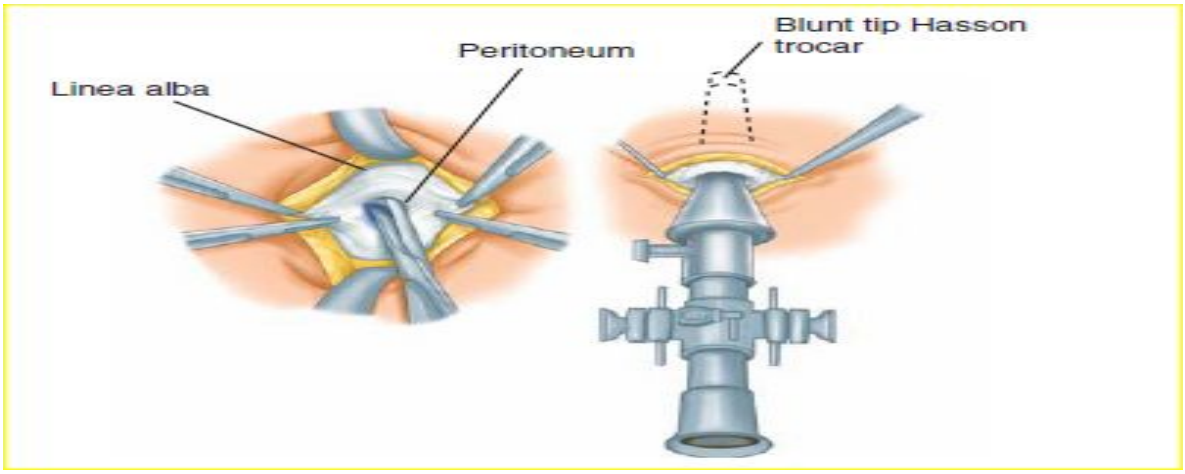


Fig:3 The open laparoscopy technique involves identification and incision of the peritoneum, followed by the placement of a specialized trocar with a conical sleeve to maintain a gas seal

At the completion of the operation, all trocars are removed under direct vision, and the insertion sites are inspected for bleeding. If bleeding occurs, direct pressure with an instrument from another trocar site or balloon tamponade with a Foley catheter placed through the trocar site generally stops the bleeding within 3 to 5 minutes. When this is not successful, a full-thickness abdominal wall suture has been used successfully to tamponade trocar site bleeding.

It is generally agreed that 5-mm trocars need no site suturing.10mm trocars placed awayfrom the midline and above the transverse mesocolon do not require repair. Conversely, if the fascia has been dilated to allow the passage of the gallbladder or other organ, it should be repaired at the fascial level with interrupted sutures. The port site may be closed with suture delivery systems similar to **crochet needles** enabling mass closure of the abdominal wall. This is especially useful in obese patients where direct

fascial closure may be challenging, through a small skin incision. Failure to close lower abdominal trocar sites that are 10 mm in diameter or larger can lead to an incarcerated hernia.

For retroperitoneal locations, balloon dissection is effective.This access technique is appropriate for the extraperitoneal repair of inguinal hernias and other advanced laparoscopic surgeries.The initial access to the extraperitoneal space is performed in a way similar to direct puncture laparoscopy, except that the last layer (the peritoneum) is not traversed.Once the transversalis fascia has been punctured, a specialized trocar with a balloon on the end is introduced.The balloon is then inflated to create a working space.

DIFFERENT PORT CLOSURE TECHNIQUES IN LAPAROSCOPY SURGERY

Although MIS cause reduction of the pain to the patient postoperatively ,with better cosmesis, but with time ,new challenges arrive.One of the challenges is port closure techniques in order to prevent trochar site hernia and others complications.Port closure technique could be classified into two groups from a technical point of view.

1.With laparoscopic visualisation (must be seen through telescope)

2.Without laparoscopic visualisation (must be seen by surgeon,no telescope)

FIRST GROUP(With laparoscopic visualisation)

The manipulation of this group is performed from inside the abdomen under direct visualization, the maximum safety in avoiding visceral injuries.

These techniques include :

1. Maciol needles,

2. the Grice needle,

3.Catheter or spinal needles,

4.The endoclose device

5The Gor-Tex device,

6.Reverdin,

7.Deschamps needles,

8.Semm's emergency needle with adistal eyelet;

9.The modified Veress needle with a slitmade in the retractable blunt tip;

10.Dental awl with aneye;

11.Prolene 2/0 on a straight needle aided by a Veress needle;

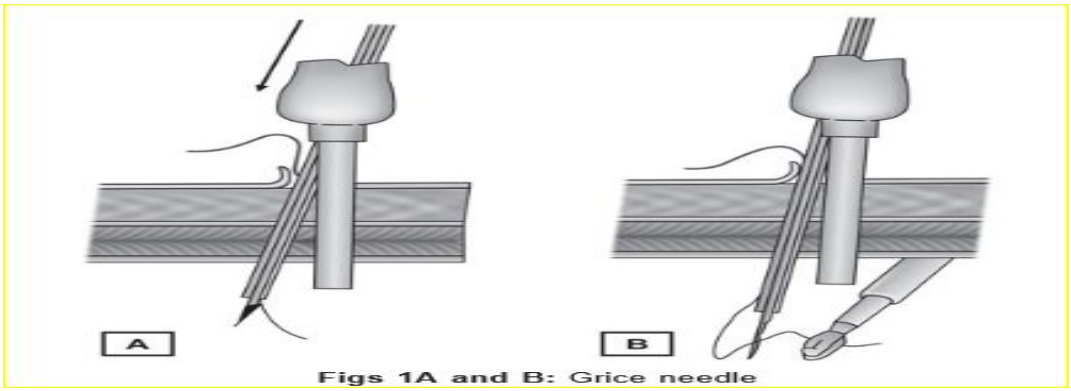
12.Straight needle armed with suture;

13.Autostitch (United states surgical),

14.A modified Veress needle bearing a crochet hook at the tip,

15..Veress needle loop technique

Grice needles Used by Stringer et al:



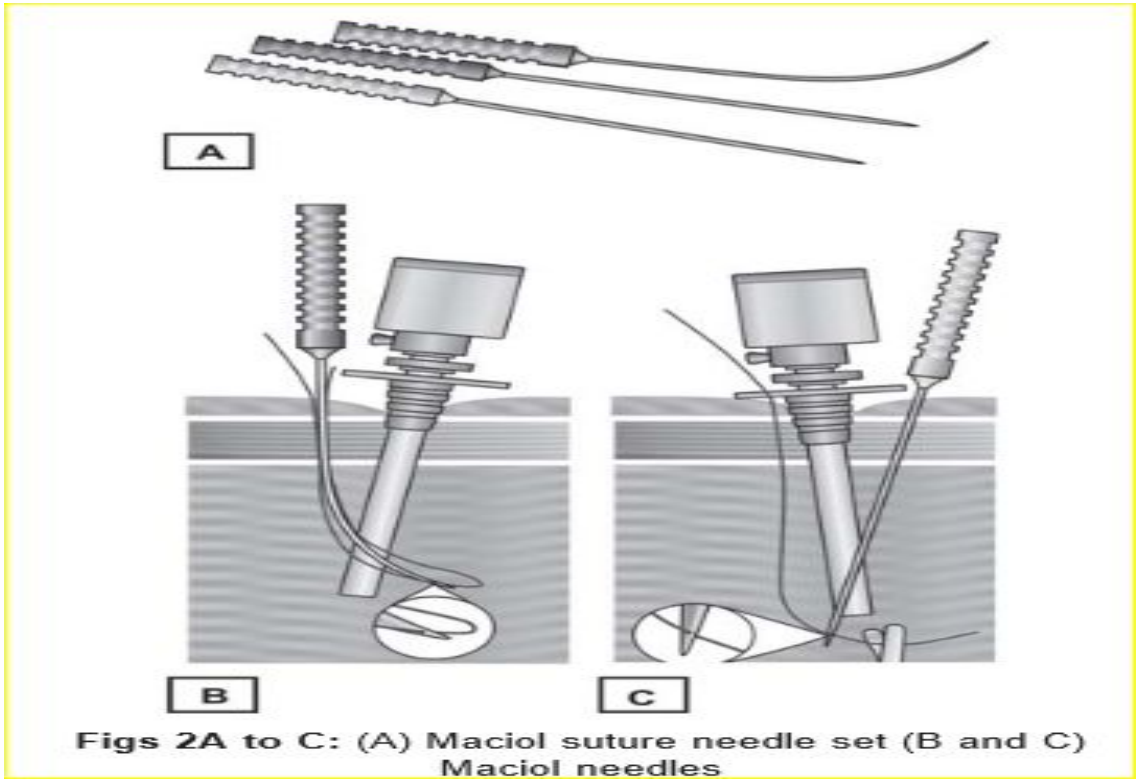
Figs 1A and B: Grice needle

A Grice needle (Figs 1A and B) was inserted at an angle along the side of a lateral trocar. Under direct laparoscopic visualization, the needle was placed through both the peritoneum and the fascia. Within the abdomen, the suture was grasped and removed from the Grice needle with a grasper inserted from the opposite trocar. The

Grice needle then was removed and reinserted opposite the previous puncture, again at an angle along the trocar. The suture was regrasped with the Grice needle and pulled out of the abdomen. After complete removal of the trocar, the suture was

tied under direct laparoscopic visualization

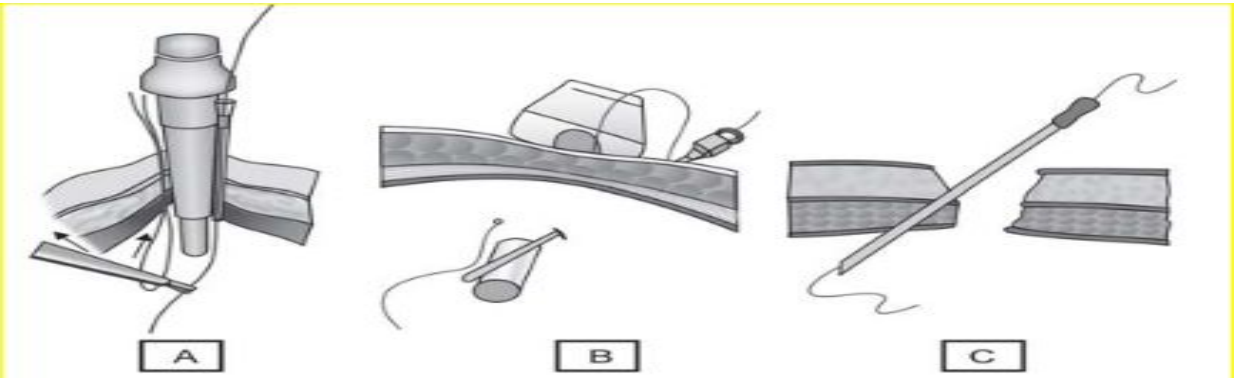
Maciol needles Contarini reported using Maciol needles (Core Dynamics, Inc. Jacksonville, FL, USA, Maciol needles (Fig. 2A) are a set of three needles.Two black handled introducers, one straight and one curved, and a golden-handle retriever.The introducer needle (needle with an eye) is used to pass the suture through the abdominal wall into the peritoneal cavity from the subcutaneous tissue (Fig. 2B). The retriever needle (needle with a barb) is next passed into the abdomen on the opposite side of the defect to retrieve the suture, then pulled back through the tissue (Fig. 2C). The procedure is performed under direct laparoscopic visualization before trocar withdrawal and does not require any enlargement of the skin incision



Figs 2A to C: (A) Maciol suture needle set (B and C) Maciol needles

Vein catheter, angiocath needle, and spinal cord needle.Nadler et al.

(used a venous catheter) (Fig. 3A).



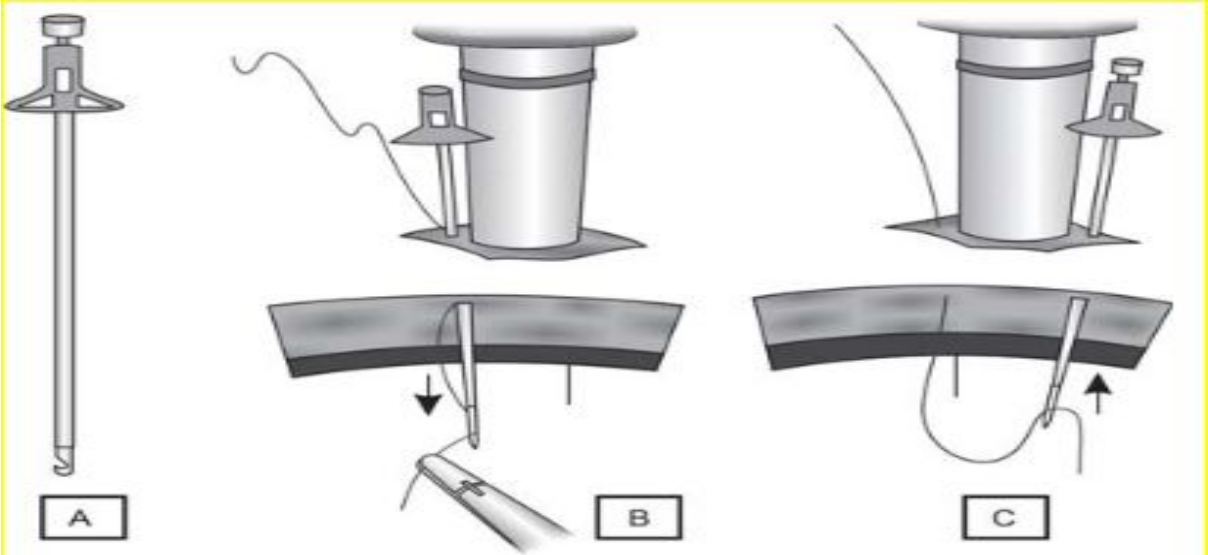
Figs 3A to C: Vein catheter, spinal cord needle, and angiocath needle

Direct laparoscopic visualization to secure the abdominal wall fascia and peritoneum, (Fig. 3B).A continuously running nonabsorbable 0-polypropylene suture is inserted through a 15 gauge needle, which penetrates all subcutaneous layers including the fascia, going around the umbilical opening at a 45 degree angle to create a purse string. The needle penetrates the fascia at a distance of 0.5 to 1 cm from the trocar site. After the first insertion of the needle, an endograsp forceps is used to pull the free suture edge into the abdomen Then the needle, still holding the suture, is reinserted at the next point and, with the use of the forceps, the free intra-abdominal edge of the suture is locked through the loop that has been created. This maneuver is repeated another three times until the purse string is fashioned.In the final step, the suture edge, which is pulled by the last loop, and the needle are withdrawn outside the abdomen near the site of first needle insertion, and both edges of the suture are tied up onto the fascia, angiocath

needle to perform the same closure technique (Fig. 3C). The large 10 mm trocar is removed, and the pneumoperitoneum is maintained in all abdominal trocar wounds 10 mm or larger simply by placement of a gloved finger over the top of the wound.

Endoclose suture device.

This is a disposable endoclose device (Tyco Auto Suture International, Inc. Norwalk, CT, USA) with a spring-loaded suture carrier (Fig. 4A) is loaded with a 0-absorbable suture and introduced into the abdomen between the edge of the skin and the port.The suture is released and dropped in the abdominal cavity, after which the device is removed (Fig. 4B). The spring-loaded suture carrier is then passed through the fascia and peritoneum 180degree from the original insertion site between the skin incision and the port.With the assistance of a 5 mm grasping forceps through a secondary port, the suture is reloaded onto the opened notch in the endoclose needle (Fig. 4C). The device and suture are brought out of the abdomen. The port is removed, and the suture is tied to approximate the fascia and peritoneum.



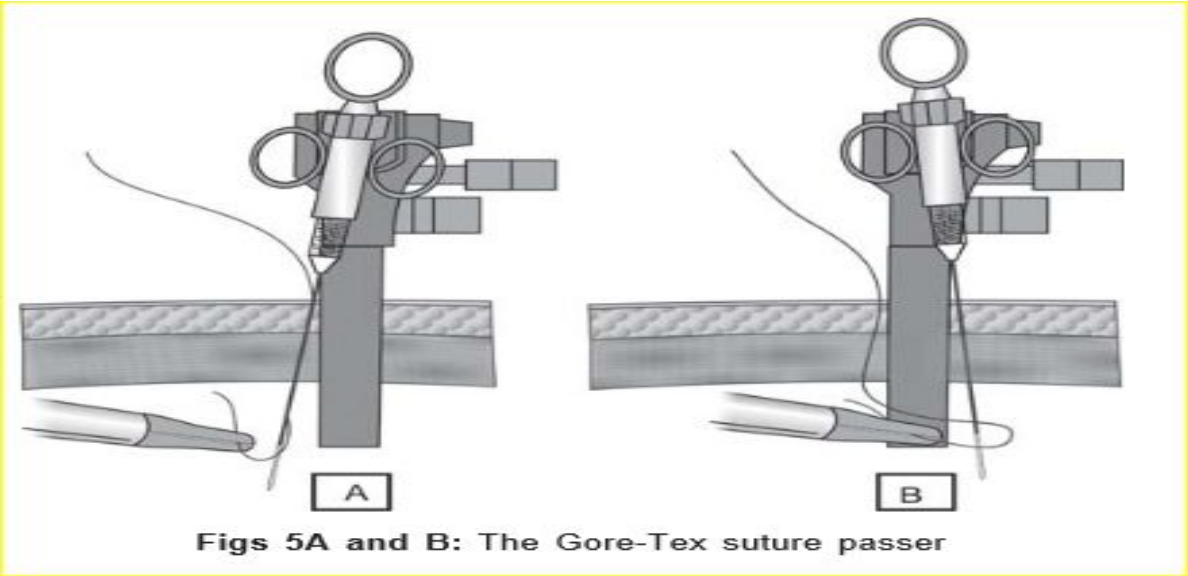
Figs 4A to C: Endoclose suture device

THE GORE-TEX SUTURE PASSER

Chapman used the Gore-Tex suture passer which is a reusable trocar closure device. With the trocar still in place and the abdomen distended by the pneumoperitoneum, the laparoscope is used to view the trocar site to be closed. The end of the trocar should still be visible within the peritoneal cavity.The suture is loaded into the Gore-Tex Suture Passer, then passed through the subcutaneous tissue and fascia on one

side of the trocar (Fig. 5A). The suture is released from the passer by pushing down on the handle, then grasped intraperitoneally with a blunt grasper. The suture passer is then removed and inserted through the subcutaneous space and fascia on the opposite side of the trocar. The suture is placed back in the jaw of the suture passer and locked into

position by pulling back on the handle (Fig. 5B). The suture is then removed by pulling the passer out. Next, the trocar may be removed and the suture tied dow



Figs 5A and B: The Gore-Tex suture passer

CARTER-THOMASON DEVICE

The Carter-Thomason close-sure system is of two parts (Figs 6A and B): The

Pilot guide and the Carter-Thomason suture passer. Closure of the port incision requires four easy steps:

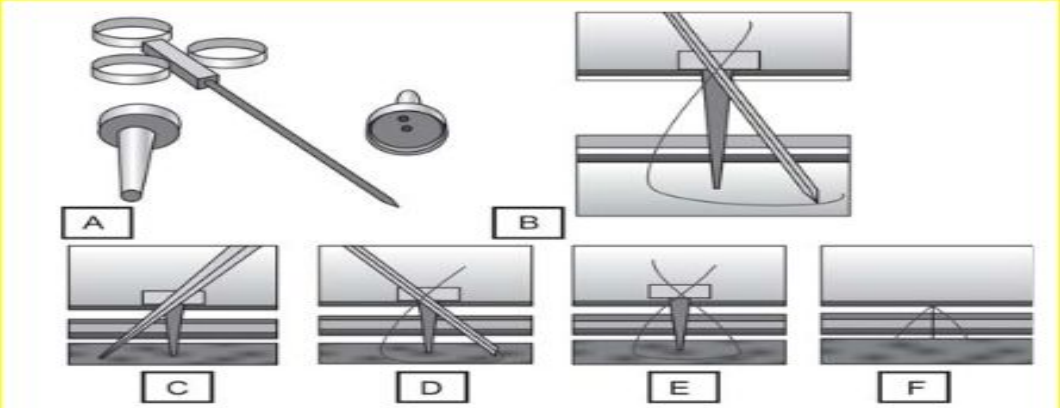
1) Use the suture passer to push suture material through the Pilot guide, fascia,muscle, and peritoneum into the abdomen, then drop the suture

and remove the suture passer) (Fig. 6C),

2) Push the suture passer through the opposite side of the pilot guide and pick up the suture (Fig. 6D),

3) Pull the suture up through the peritoneum, muscle, fascia, and guide (Fig. 6E), and 4) Rremove the Pilot guide and tie (Fig. 6F).

Designed specifically for bariatric and obese patients. The suture passer and Pilot guides have been lengthened to reach through the peritoneum in the larger patient to provide full-thickness closure in this at-risk group.



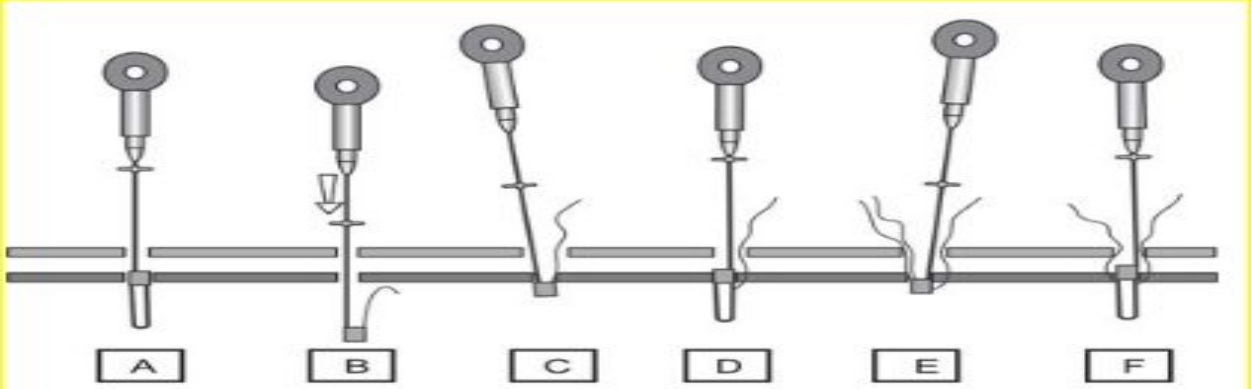
Figs 6A to F: Carter-Thomason device

ENDO-JUDGE DEVICE

The Endo-Judge wound closure device (Figs 7A to F), a 14 gauge hollow J-shaped needle that serves as a carrier for suture material and a device for performing the fascial closure. The suture is mounted on a reel at the proximal end of the device

and fed to the hollow needle until it is delivered out the needle tip. The plastic oval shield (olive) at the J-portion of the needle maintains pneumoperitoneum and prevents

injury to underlying structures. Reverdin and Deschamps needle can also be used same way to close the port (Figs 13A and B). It is controlled by a sliding ring located on the shaft of the instrument. The device should be used under direct visualization. The Endo-Judge is passed into the abdomen until the olive is visible below the peritoneum. The instrument is then positioned in a plane perpendicular to the trocar incision to expose the needle and pass it through the peritoneum and fascia until it exits the skin incision.The end of the suture is grasped and tagged with a hemostat. The needle is dropped back into the olive, and the instrument is rotated 180. The olive is again dropped to expose the needle, which is again passed through the peritoneum and fascia. After removal of the Endo-Judge, the suture is tied, creating a secure, airtight fascial and peritoneal closure



Figs 7A to F: Endo-Judge device

THE 5 mm TROCAR TECHNIQUE

Rastogi and Dy developed a simple technique using the regular curved needle and sutures for closure of peritoneal and rectus sheath defects at the port site.Using a 5 mm telescope,they inspect the defect from the inside, and then pass a hemostat

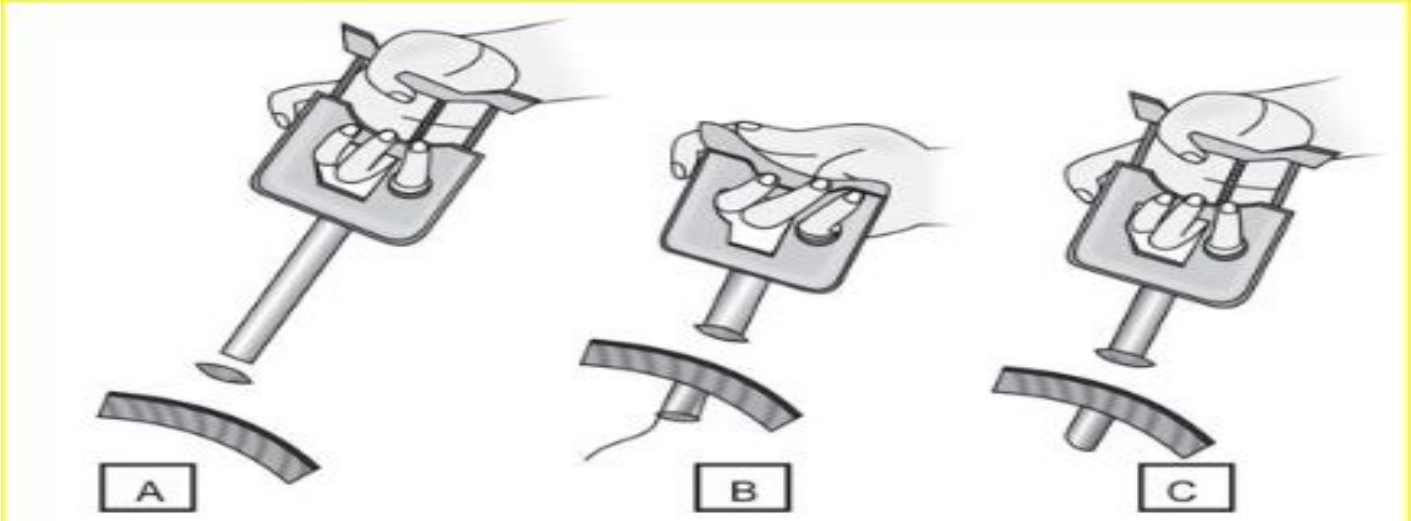
through the incision. Under direct telescopic vision, the peritoneum and rectus sheath are grasped at both the upper and lower edges and pulled through the incision,facilitating the passage of the needle. **Chatzipapaset et al.** developed a similar closure technique using standard sutures with straight needles, a 5 mm laparoscopic grasper, and a 4 mm hysteroscope

TAHOE SURGICAL INSTRUMENT

LIGATURE DEVICE

It is disposable. Initially, the laparoscopic cannula is removed. A 0-absorbable suture is placed into the hollow delivery Tahoe needle without extension beyond the distal end of the needle(Fig. 8A).The device is introduced into the abdomen after the needles are first inserted through the two holes on an introduction disk. The needle tips are then guided to pierce thefascia on either side of the port site. The lock is released, and the handle is depressed until the metal retrieval loop is extended and encompasses the tip and distal shaft of the delivery needle.The suture is fed into the delivery needle until it lies several

inches beyond the distal end of the delivery needle and through the retrieval loop (Fig. 8B). The handle is released, allowing the retrieval loop to retract, thereby securing the suture in the closed metal loop. The entire device is withdrawn from the abdomen(Fig. 8C), thus delivering the tow ends of the suture onto the abdominal wall. The suture is tied, approximating the peritoneum and fascia.



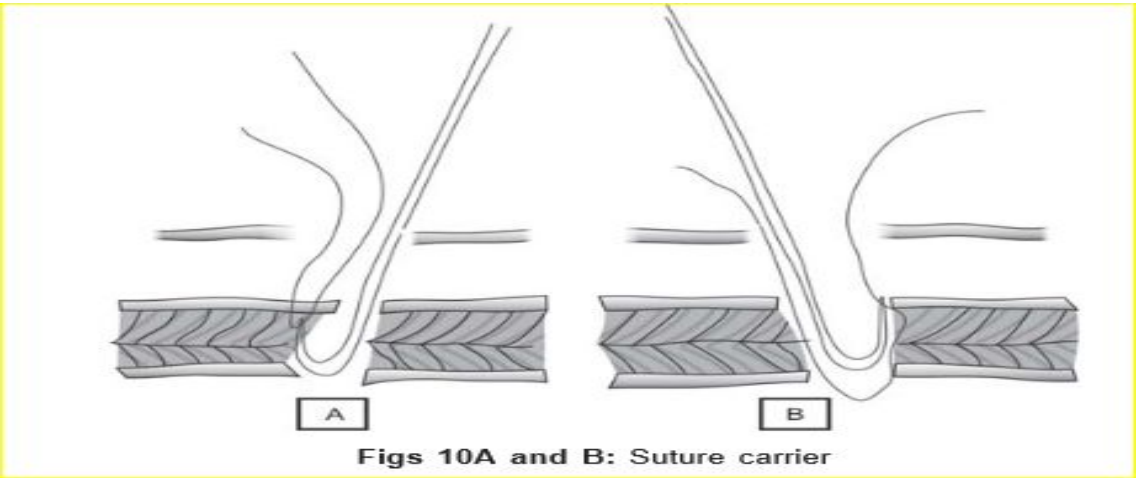
Figs 8A to C: Tahoe surgical instrument ligature device

SECOND GROUP (Without laparoscopic visualisation);

Port closure should be performed under direct visualization which requires good insufflation of the abdomen.When desufflation is performed, a tactile sense should be used to close the port. These techniques are applicable during insufflation or after desufflation.

These techniques include **the suture carrier**, **the dual hemostat technique**, the **Lowsley retractor, application of bioabsorbable hernia plug in trocar sites**.Preliminary placement of fascial stay sutures above and below the prospective trocar site; Foley catheter threaded through the port hole for the elevation of fascial edge upon traction; fish-hook needle improvised out of a hypodermic needle by bending it 180 Grooved director; U-shaped purse-string suture placed in the fascia around the port hole

SUTURE CARRIER



Figs 10A and B: Suture carrier

Jorge et al and Li and Chung developed a hook suture carrier (Figs 10A and B) for closure of trocar wounds, making use of the vertical rather than the horizontal space.

The suture carrier is a hook suture carrier modified from a simple hook retractor with an eye drilled into the tip through which suture material can be threaded. The handle is 24 cm long, and the size of the hook approximates the size of the general

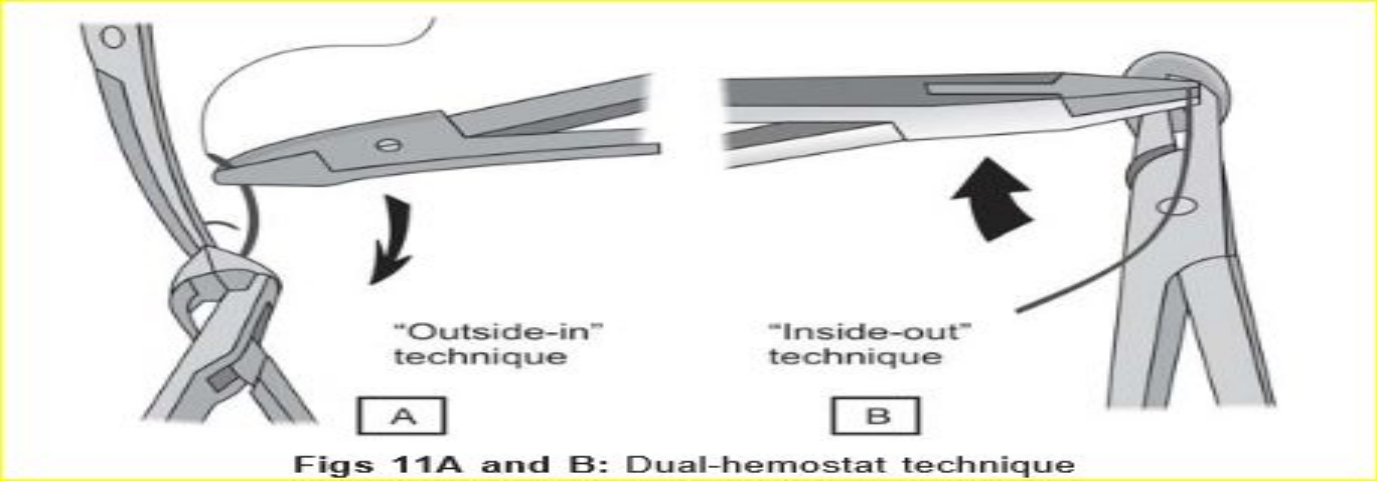
closure needle . To begin closure, the fascial edge is lifted vertically with a hook retractor, and the suture carrier is partially inserted into the wound to catch the peritoneum and fascia under direct vision, piercing it from the undersurface (Fig. 10A). A suture (such as 0-polypropylene) is threaded into the exposed eye of the carrier and brought beneath the fascia. This same suture is then carried to the opposite edge of the wound using the carrier, executing a stitch from inside out. After the suture is disengaged from the carrier, a simple stitch is accomplished with the knot on the surface when tied (Fig. 10B)

DUAL-HEMOSTAT TECHNIQUE

Spalding et al reported the dual-hemostat technique (Figs11A and B), which is very simple, using two hemostats and a needle driver with suture and needle. The first hemostat is placed into the wound, after which the tips are spread open and the

fascia is lifted up away from the underlying abdominal viscera.The second hemostat is used to retract the overlying subcutaneous tissue. Then the suture needle is driven through the fascia to exits between the splayed tips. The procedure is repeated at the

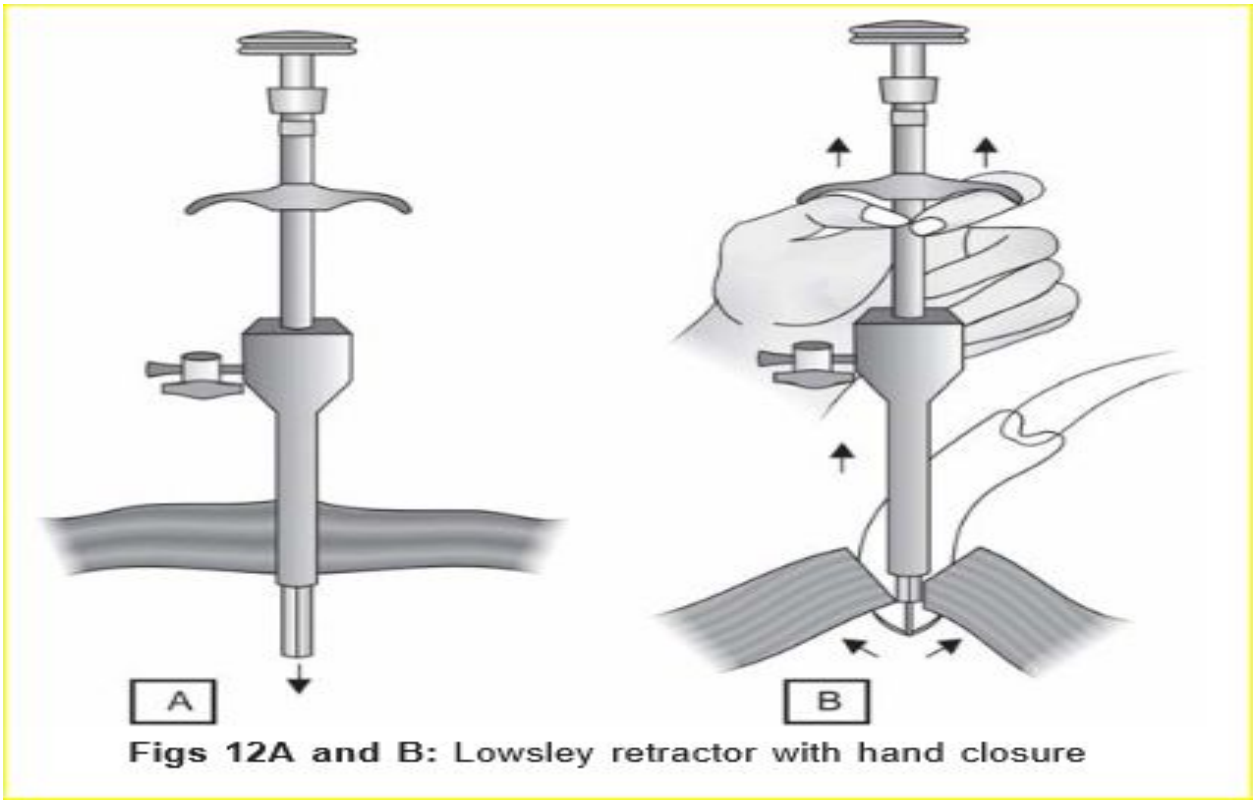
opposite side of the wound.



Figs 11A and B: Dual-hemostat technique

LOWSLEY RETRACTOR WITH HAND CLOSURE

This technique uses the straight Lowsley retractor ,a regular needle driver, and a 0-absorbable suture on a curved needle.The closed straight Lowsley retractor is passed through the 12 mm port and into the peritoneal cavity (Fig. 12A). The blades of the Lowsley retractor are next opened maximally to 180. The port then is removed from the abdomen along the shaft of the Lowsley retractor, leaving only the retractor in the wound. The retractor and the port are pulled upward. The fascia is tented toward the skin surface and exposed. A standard hand-sutured closure with 0 absorbable suture then is performed (Fig. 12B).



Figs 12A and B: Lowsley retractor with hand closure

Laparoscopic port site complications

Laparoscopic techniques have revolutionized the field of surgery and offer several advantages over laparotomy including lower patient morbidity rates, reduced hospital length of stay and earlier return to normal activities.Although rare,several port site complications have been reported in the literature.

Laparoscopic port site complications can be access-related or post-operative. Post-operative laparoscopic port site complications can have an early or delayed presentation.Complications are related to

1.Port-site incision size,

2.Number of port sites,

3.Obesity,

4.Improper sterilisation of instruments and

5.umbilical ports.

Obesity has been shown to be a major risk factor for port site complications due to the need for a larger skin incision, longer trochars, limitation in mobility of the instrument, increased subcutaneous tissue, and poorer wound healing.Port site complication rate increases with the number of ports used Laparoscopic cholecystectomy has been shown to be the commonest procedure associated with port site complications.

. **ACCESS RELATED COMPLICATIONS(Early presentation):**

They are Immediate port complications and they are as follows:

A)Vascular injury

B) Omental entrapment

C) Bowel injury

D)Bladder injury

E)Port site subcutaneous emphysema and air embolus

Vascular injuries:

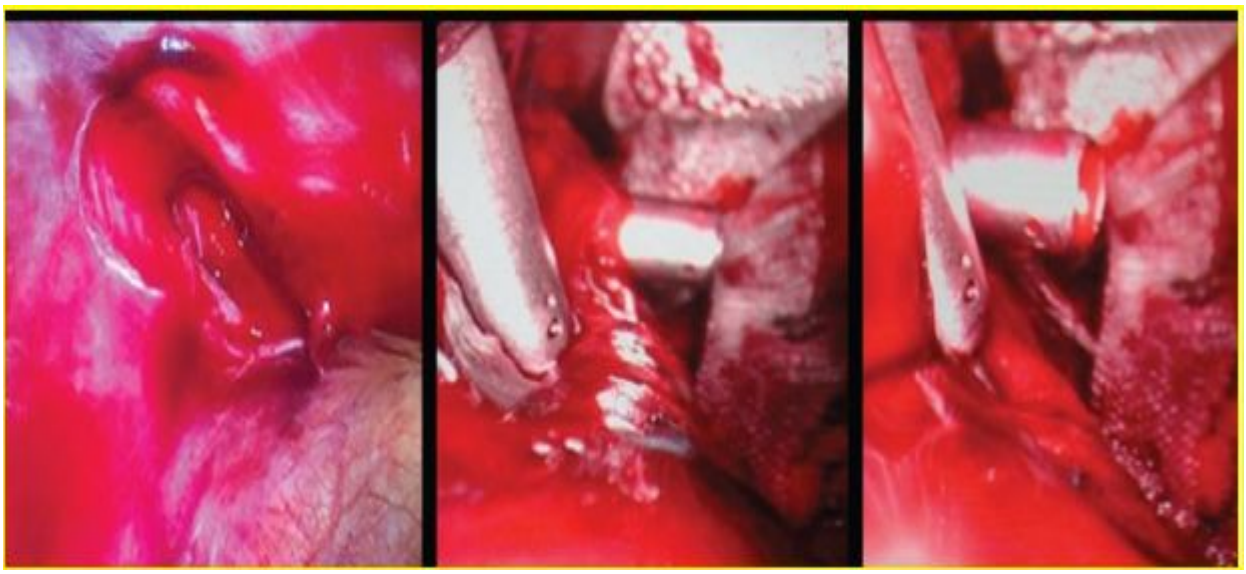


Fig:port site bleeding

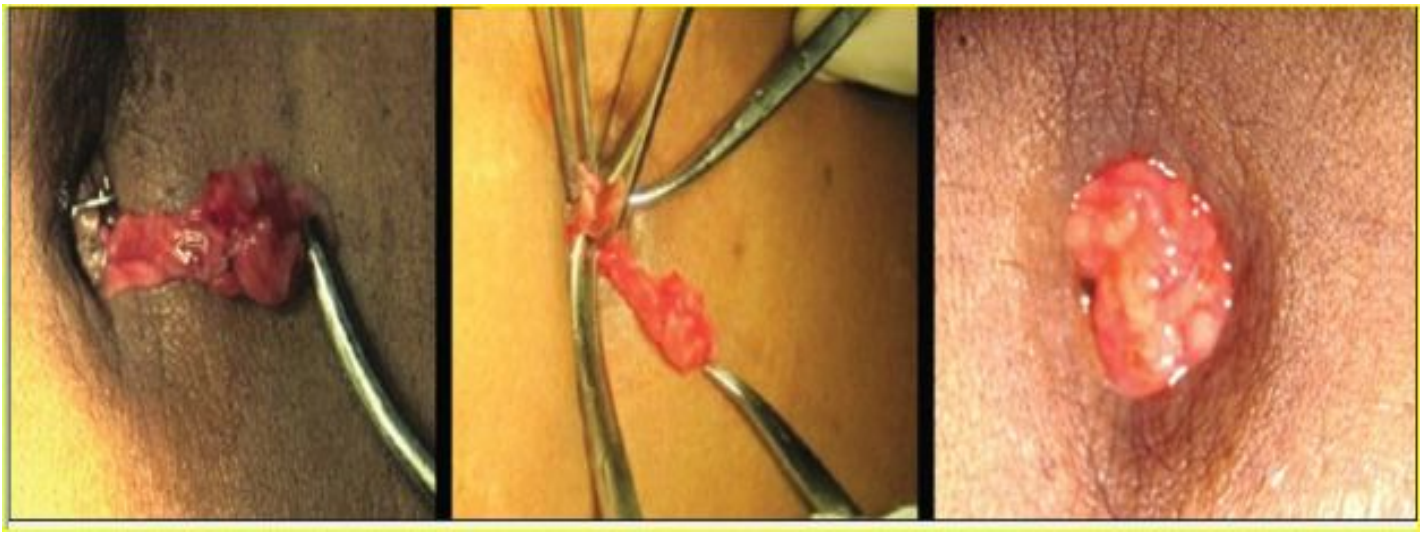
Major vascular injury during laparoscopic surgery is rare and usually occurs during insertion of secondary trochars and pelvic procedures.Injury to epigastric vessels can be related to carelessness during the operative procedure usually during the placement of secondary trocars which should be placed under direct vision and with prior illumination of the abdominal wall. Bleeding from the abdominal wall may not become apparent until after the port is removed because the port may tamponade muscular or operative procedure usually during the placement of secondary trocars which should be placed under direct vision and with prior illumination of the abdominal wall. Bleeding from the abdominal wall may not become apparent until after the port is removed because the port may tamponade muscular or subcutaneous bleeding. In addition to visually inspecting the access site upon its creation, the site should also be

inspected during and following removal of the port. Bleeding points can usually be identified and managed with electrocautery.

On occasion, the skin incision may need to be enlarged to control the bleeding. If persistent bleeding continues, a Foley catheter can also be inserted, inflated, and gentle traction applied to tamponade the site. Also, U-stitches can be placed into the abdominal wall under direct laparoscopic visualization using a suture passer with absorbable braided sutures. A number of specialized instruments have been devised for fascial closure at the port site and these may also be useful for managing abdominal wall bleed

Omentum-related complications

(omental entrapment,laceration and penetrating injuries of the omentum)



Omental related complications are rare but is reported in some studies.Various factors are attributed to the occurrence of these complications including

a) Removal of the ports prior to complete deflation of the peritoneal cavity,

b) Inadequate/faulty closure of the port site incisions, and

c) Large incision at the port site.

They can be avoided or managed as follows:

a) After the procedure, all the ports should be removed under careful vision,

b) All the accessory ports to be removed under vision followed by the releasing pneumoperitoneum by opening the valve of 10 mm cannulas,

c) After release of gas is completed, the primary port and telescope are to be removed together, with a clear view at all times that the port is free of any entrapped bowel,

d) To limit the size of the port incisions,

e) A secure and adequate closure of the port sites of size 10 mm and above should be ensured.

Bowel injuries:

Bowel injuries most frequently involved the small intestine followed by colon,duodenum and stomach.The injuries may be recognised at the time of surgeries and present with post operative peritonitis.Bowel injury is associated with mortality of 5% .Direct injuries can be caused by the verees needle or by the operating trochar.This type complication require immediate repair either laparoscopically or by laparotomy.Minor perforation may not be easily recognised and may present with

delayed sepsis.Trochar injuries are preventable by proper techniques and adequate care.Carelessness and overconfidence can cause trochar injury.

Bladder injury:

Laparoscopic injuries to the bladder may result from verees needle or at the time of insertion of lower abdominal trochar.The risk of abdominal perforation increases with previous abdominal surgery,previous bladder surgery and congenital anomaly.The presence of gas in the urobag or unexplained urinary tract bleeding during or after the procedure should increase the suspicion of bladder injury.Decompression of the bladder with the foley's catheter may help to reduce the risk of injury.Diagnosis can be made with a retrograde cystogram.

Subcutaneous emphysema:

Improper placement of veress trochar leads to this complication.Spontaneous resolution occur within 30-60 mins after exsufflation.The position in the peritonial cavity can be confirmed by hissing sound of air entering the peritonial cavity because of the negative intraabdominal pressure and on placing a drop of saline on tip of the needle gets suck into the peritonial cavity.It can also be confirmed by Spring test,Aspiration test

Common delayed port site complications

They include

1. Hernia
2. Infection/Abscess
3. Haematoma
4. Seeding of malignancy
5. Bowel obstruction

Hernia at trocar ports

Port site hernia is one of the complications of laparoscopy surgery.It is because of the following reasons

1.Failure to reapproximate fascial wound edges ,

2.Infection,

3.Premature suture disruption.

A bulge at a previous port site should immediately raise suspicion of port site hernia

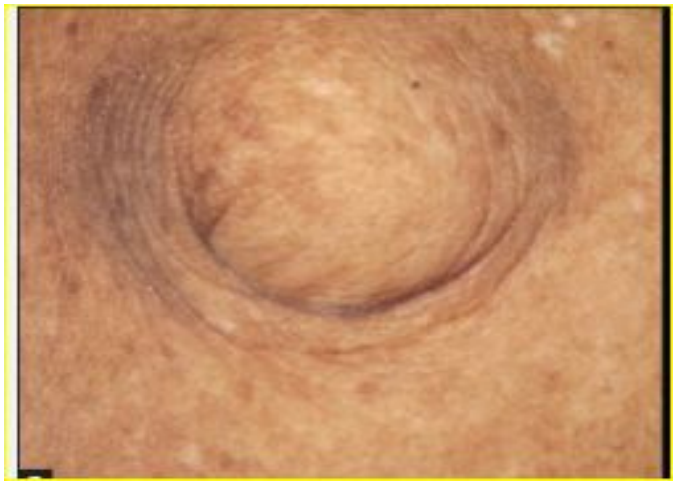


Fig:Port site hernias

Hernia at trocar ports is classified into three types

1.The early-onset type (i.e., occurring immediately after the operation, with small-bowel obstruction (especially Richter hernia) frequently developing,

2.the late-onset type (i.e.occurring several months after the operation, mostly with

local abdominal bulging and no small-bowel obstruction

developing [laparocele]), and

3) the special type (i.e.,indicating protrusion of the intestine and/or omentum).

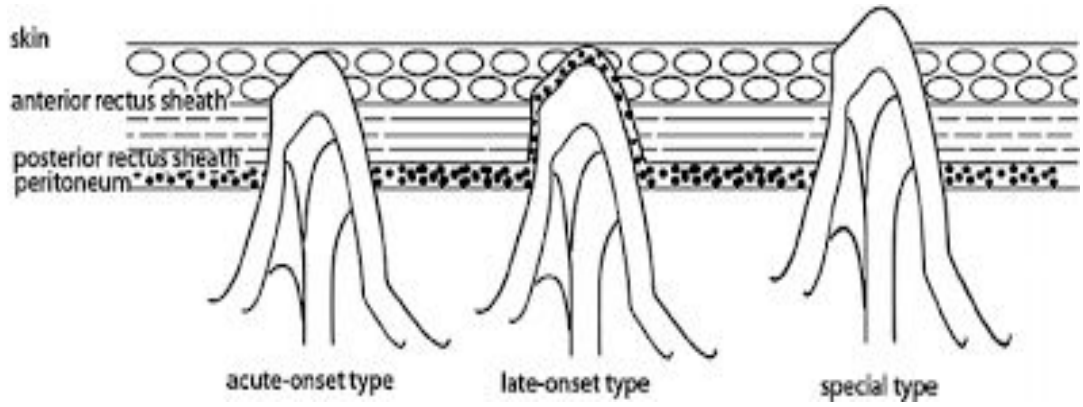


Fig:Types of port site hernia

The Richter hernia usually presents days later, and the patients experience a delay in diagnosis due to persistence of bowel function leading to significant morbidity.Thiscomplication of minimally invasive surgery is rare, but potentially dangerous.

The usual presentation involves crampy abdominal pain with nausea and vomiting.

Treatment is by reduction of the bowel that is incarcerated, followed by repair of the fascial defect.

Although some authors advocate open repair or local exploration combined with laparoscopy, the laparoscopic approach is acceptable treatment at the time of diagnosis, as long as the incarcerated bowel is not compromised or frankly ischemic.

The following risk factors for the development of trocar-site hernias have been identified:

1.The trocar diameter,

2.The trocar design,

3.Pre-existing fascial defects, and

4.Some operation and patient-related factors.

Many authors believe that inserting the 10 mm lateral trocar in an oblique fashion or as a Z-tract will reduce hernia formation by putting the external and internal fascias at different levels.

So It is recommended that all 10 and 12 mm trocar must be closed. The development of nonbladed obturators with integrated stability sleeves allows for creation of a muscle-splitting dilated laparoscopic port site with minimal abdominal wall defects after removal of trocar sleeves,may play a role. There is a debate concerning 5 mm trocar fasciaclosure, especially in children.

Some authors insist that all laparoscopic puncture wounds, even those smaller than 10 mm, should be closed at the fascial level in infants.

Kulacoglu,Reardon et al,and Nezhat et al agree that it may not be necessary to recommend routine closure of all 5 mm port sites. However, when such a port has been used for active manipulation during a long operation, closure of the fascia should be considered to avoid hernia, port closure with the maintenance of the pneumoperitoneum

during closure keeps the anterior abdominal wall away from the bowel, reducing the likelihood of iatrogenic injury. It also provides easy assessment of adequate closure by the acquisition of a "gas-tight" seal and allows the potential for intraperitoneal inspection of the closed port site via remaining lateral ports, further ensuring that the bowel is not implicated in the repair, and that homeostasis has been achieved,at the end the perfiction of the clouser technique have proliferated and improvements are continuously being made. Practising surgeon should be congnisant of the full range of techniques while familiarizing themselves with the useful ones deemed simple, safe and effective.The tight closure of fascia will prevent ascitic fluid leak. For closure of the skin, **transcutaneous closure with absorbable material seems to be the most suitable technique**

Port site infection/Abscess

Port site infections (PSI) although infrequent,is one of the bothersome complication which undermine the benefits of minimal invasive surgery. Not only does it add to the morbidity of the patient but also spoils the reputation of the surgeon.Despite the advances in the field of antimicrobial agents , Sterilization techniques, surgical techniques, operative room ventilation, port site infections still prevail .

PSIs The presence of significant peri-incisional erythema, wound drainage, and fever may indicate the presence of a necrotizing fascial infection.

PSI is of two types superficial and deep,In superficial PSI only the skin and

subcutaneous tissue are involved. Superficial skin infection is more common and has been reported many studies.

Umbilical port site is the most common site of PSI followed by epigastric port site. In the literature, there is great emphasis on the increased frequency of umbilical PSI and the role of umbilical flora in the development of PSI.Emphasis is also there on the increased frequency of PSI and the trocar site of extraction. All gall bladder specimens in cholecystectomy were removed through the epigastric port. Wound infections can be prevented by appropriate administration of antibiotic prophylaxis, sterile techniques, and the use of specimen bags during specimen extraction.Once present, infections are treated with drainage, packing, and antibiotics as appropriate.

Ten Commandments for preventing PSI

(1) Use of disposable trocars and instruments and adequate availability of properly sterilized reusable trocars to cover all the surgical procedures in a day.

(2) Use of autoclavable laparoscopic hand instruments ;

(3) Use of instruments with good ergonomics, limited joints and facility for proper cleaning of the debris collected in its crevices;

(4) A proper cleaning of the instruments is best achieved by ultrasonic technology.Use of autoclaved water for cleaning the instruments after dismantling;

(5) Proper guidelines should be followed regarding the concentration ,contact time and cycles of use for instrument sterilization with liquid sterilizing agents;

(6) Use of plasma sterilizer or ethylene oxide in between the consecutive surgery for instrument sterilization.

(7) Avoiding inter-departmental sharing of instruments,such as using instruments for gynaecological or urological procedures.

(8) Avoiding spillage of bile or gut content in the operative area or the port site;

(9) Use of non- porous specimen retrieval bags for retrieving the specimen; and

(10) Through irrigation and cleaning of the of the port site before closure .

Sterilization and Upkeep of Laparoscopic Instruments & Equipment

Laparoscopic surgery requires sophisticated and precisely calibrated instruments. The essential difference between instruments used in open surgery and people utilized for laparoscopic surgery would be that the latter are more complex in design and yet delicate in construction. Thus the laparoscopic instruments are more vulnerable to lodging of bioburden (micro-organisms and debris) within their crevices. Thus, the LI are difficult to clean, sterilize adequately and maintain as compared to their counterparts used in open surgery. Moreover, owing to their delicate design, gentlest methods have to be used for cleaning in addition to sterilization. Also, meticulous cleaning, maintenance in addition to sterilization are necessary so that not to compromise the

safety from the patient, the surgeon or other operating room personnel. The rise in complexity of the laparoscopic procedures as also the emergence of resistant strains of bacteria, mycobacteria, fungi and viruses makes it imperative to effectively clean and disinfect instruments. Sterilization is the absolute elimination or destruction of forms of microbial life.

It may be achieved with steam, gas or chemicals. However, disinfection is the relative removal of pathogenic organisms except spores.

Disinfection can be:

A)High level-where all life forms except the spores are destroyed,

B)Intermediate level - where some fungi, viruses and spores are spared, or

C)Low-level - where fungi, viruses, spores and mycobacteria remain undestroyed. For laparoscopic instruments ideally sterilization or at best higher level disinfection should be used

Optimal processing of LI involves several steps that reduce the risk of transmitting infection from used instruments along with other what to healthcare personnel.

They are

1) Dismantling,

2) Decontamination,

3) Precleaning,

4) Cleaning and rinsing,

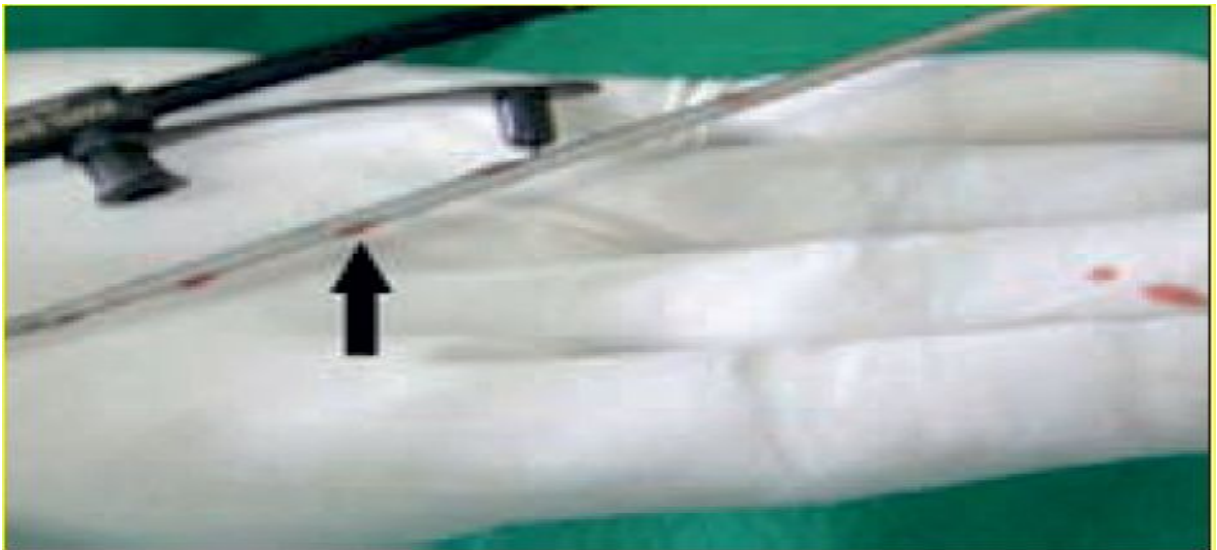
5) Drying

6)Sterilization and

7) Storage.

For proper processing, it is essential to perform the steps in correct order.

Dismantling of laparoscopic hand instruments by personnel in the CSSD



Blood drops (arrow) on the insert become apparent on dismantling the instrument

DECONTAMINATION

Instruments soaked in a disinfectant for decontamination

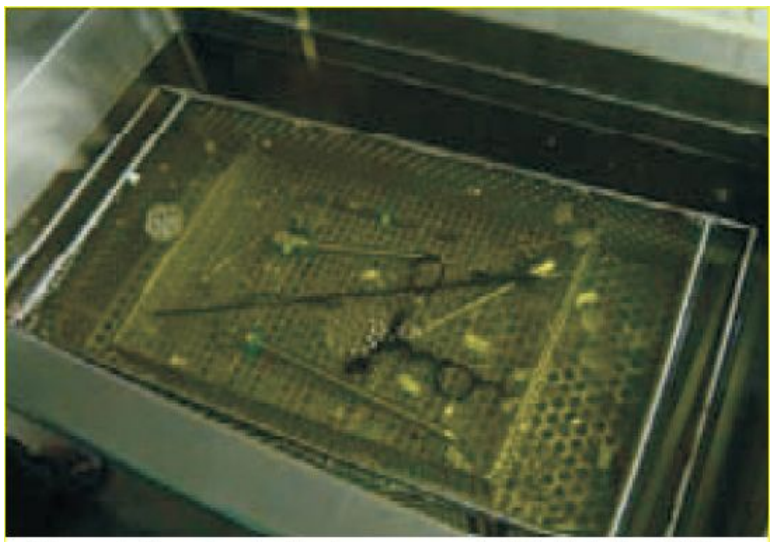


Figure 4: Decontamination in a purpose-built bath in the CSSD

PRECLEANING

: Enzymatic preparation used for precleaning

CLEANING


: Cleaning the instrument tip with a toothbrush. Inset shows dried blood on the tip of a dissector.

RINSING

: Rinsing of instruments under running water

DRYING

Drying of instruments with a jet of air.

Drying of instruments in an oven.

STERILISATION

Figure 13: Double wrapping of instruments before autoclaving.

Figure 15: Ethylene oxide sterilizer

NEW METHOD OF STERILISATION USING STERRAD STERILISER

Figure 16: STERRAD sterilizer

Storage

Proper storage is as important as proper decontamination, cleaning, sterilization, or HLD. If items aren't stored properly, all of the effort and supplies used to properly process them will have been wasted, and the things is going to be contaminated. Specific instructions for proper storage rely on whether sterilization or HLD continues to be performed, the method used, and whether the items are wrapped or unwrapped.

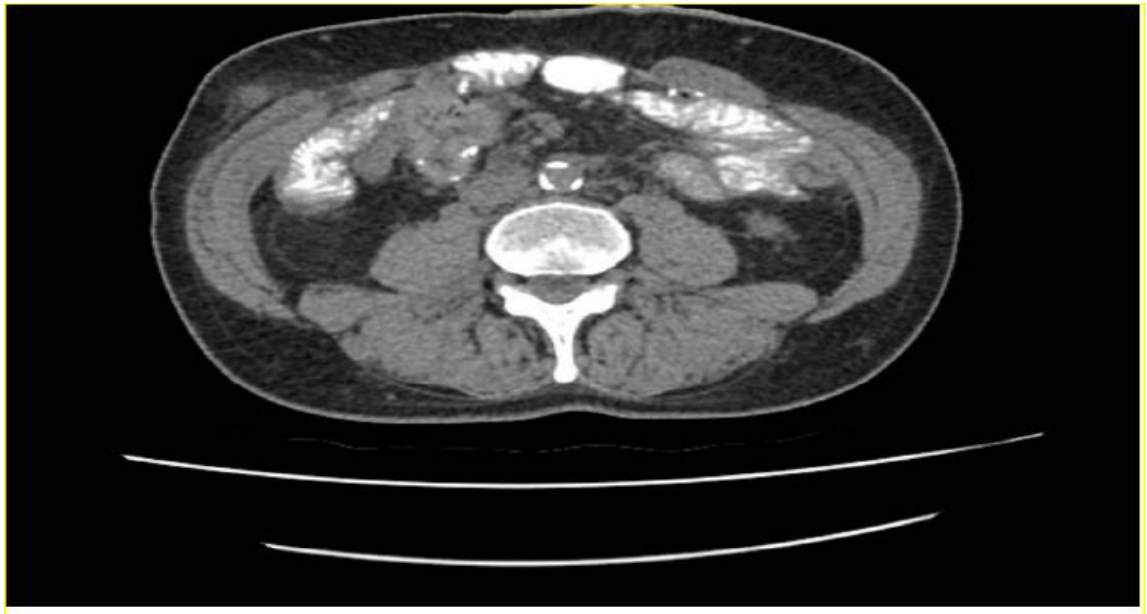
The shelf-life of a wrapped item is suffering from numerous factors, including:

- The kind of packing material used
- The number of times those is handled
- The number of people who handle the pack
- The cleanliness, humidity, and temperature from the storage space
- Whether the packs are stored on open or closed shelves
- Whether dust covers (for example sealed plastic bags) are utilize

Port site metastasis

Fig:Port site metastasis

In recent years, after laparoscopic oncological procedures,several reports of trocar site recurrence have been published.The exact mechanism of development of metastasis of the abdominal wall is unknown. However, various explanations are given in the literature. Studies show that recurrence of tumour at the port site probably can be avoided by the use of plastic bags or wound protectors to avoid direct contact between the tumour and the wound. It is also essential that extraction of the specimen is done through an abdominal incision wide enough to allow easy passage of the specimen



[redacted]Contrast-enhanced axial CT image of a laparoscopic port site metastatic deposit. The patient previously underwent a laparoscopic cholecystectomy for gallbladder carcinoma.

Contrast-enhanced sagittal CT image of a laparoscopic port site metastatic deposit. The patient previously underwent a laparoscopic cholecystectomy for gallbladder carcinoma.

Other complications associated with port sites are:

Failed entry*:* If bile, enteric contents, or blood returns at the placement of the Veress needle,the needle should be left in place and alternative access gained immediately.

Leaking port*:* If a port leaks during a procedure, it is usually due to the fascial defect being too large. This can be mitigated with additional sutures or the placement of a towel clamp to clinch the tissue closed around the trocar.

Loss of port position*:* If a port slides within the abdominal wall, the port may

need to be re-positioned and/or secured with additional sutures. The use of longer or larger diameter trocars may also be helpful.

Port site pain*:* Pain from placement of trocars is expected, but can be minimized by using the least number of ports required to perform the procedure safely,

Nerve injury**:** The location of port sites should be chosen to avoid abdominal wall nerves. Nerve injury is unlikely to be recognized intraoperatively, and usually results in persistent postoperative pain.

MATERIALS AND METHODS

STUDY DESIGN: Prospective study

PERIOD OF STUDY: 1 Year(October 2016-September 2017)

COLLABORATING DEPARTMENT: Nil

SAMPLE SIZE: 100 Patients

CONSENT: Informed and written consent obtained

CONFLICT OF INTEREST:None

FINANCIAL SUPPORT: Nil

INCLUSION CRITERIA

- **Patients who have undergone basic and advanced laparoscopic surgeries ,consented for inclusion in the study in GRH,Madurai**
- **Patients more than 13 years of age group in both sexes**

EXCLUSION CRITERIA

- **Patients converted to open surgeries**
- **Patients not consented for inclusion in the study.**

PROFORMA

Name:

Age/Sex **I.P.No:**

BMI: **Occupation:**

Address:

D.O.A: **D.O.S:** **D.O.D:**

Diagnosis:

Type of Surgery done:

Presenting Complaints:

PORT SITE COMPLICATIONS:

1.PSI

2.DISCHARGE

3.BLEEDING

4. OMENTAL PROLAPSE

5.PIH

6. PSM

7. SUBCUTANEOUS EMPHYSEMA

SELECTION OF STUDY SAMPLES:

A total of 100 patients (admitted in the surgical wards of Government Rajaji hospital,Madurai) who had undergone laparoscopic surgeries and satisfied the inclusion criteria were included in the study.All patients received antibiotics preoperatively. Reusable ports were used in 100 cases. They were reused after sterilization with ethylene oxide (ETO). Once the surgery was finished, all the instruments were removed carefully under vision. Fascia of ports ≥10 mm was closed. PSI was defined according to the National Nosocomial Infections Surveillance (NNIS) system. Centers for Disease Control and Prevention (CDC).Wounds were assessed clinically after surgery and in case of infection, were treated with regular cleaning and dressing, with empirical oral antibiotics. PSI was studied in relation to frequency, type of surgery.Similarly, port site bleeding, was studied in relation to frequency, site, type of ports, and size of ports. Omentum related complications were studied in relation to frequency, type of surgery, number of ports, and the port site involved. Further port site complications were studied in relation to age, sex, body mass index (BMI), total number of ports used, use of specimen bag,technique of port closure, and procedure performed.

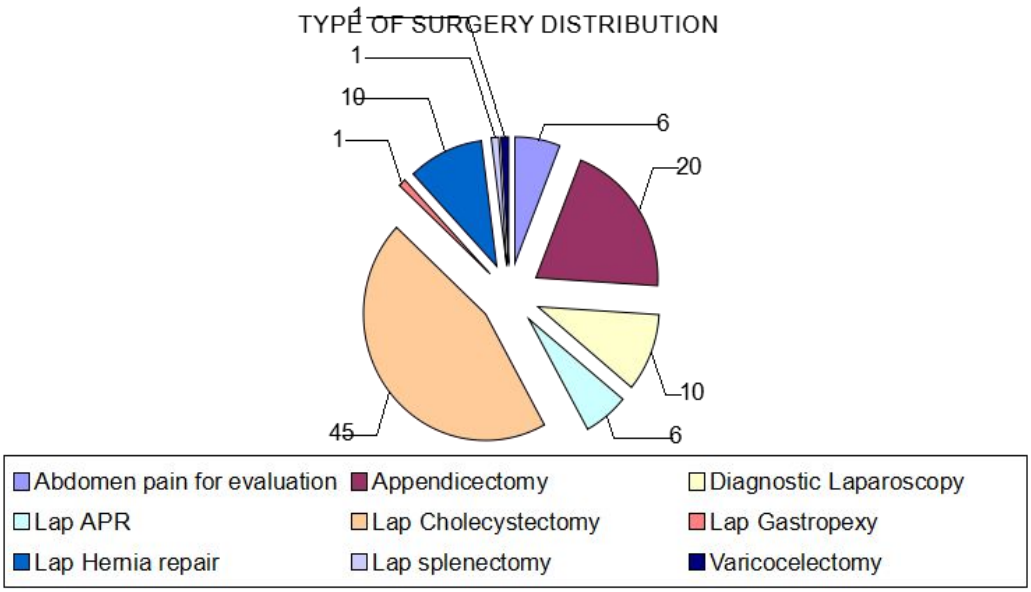
STATISTICAL ANALYSIS:

The data were analysed using statistical software like SPSS Ver.13.0, Microsoft Excel 2007.Chi Square test was used to analyse the incidence of complications.Also, individual complications were assessed and p-value for each of them was computed.

RESULTS

Tab:1 Case distribution

Diagnosis	No of Cases
Abdomen pain for evaluation	16
Acute Appendicitis	5
Acute Cholecystitis	29
Ca rectum	6
Cholelithiasis	16
Chronic appendicitis	10
Epigastric hernia	2
Gastric volvulus	1
LT inguinal hernia	2
Massive Splenomegaly	1
RT inguinal hernia	2
Subacute appendicitis	5
Umbilical Hernia	4
Varicocole	1
Total	100



Tab:2 Sex distribution

SEX	No of Cases
Male	49
Female	51
Total	100

Tab:3 Age distribution

Age Distribution	No.of cases
13- 30	23
31 - 40	37
>40	40
Total	100

Tab:4 Procedure and port site complications

Type of Surgery	Port site Complications
Appendicectomy	9
Diagnostic Laparoscopy	5
Lap APR	2
Lap Cholecystectomy	26
Lap Gastropexy	nil
Lap Hernia repair	nil
Lap splenectomy	nil
Varicocelectomy	nil
Total	42

Tab:5 PORT SITE COMPLICATIONS DISTRIBUTION

TYPES OF Cx	NO OF Cx
PSI	11
PSD	14
Bleeding	5
PIH	6
PSM	4
Omental entrapment	0
Subcutaneous emphysema	0

Tab:6 Port site complications in different surgeries

PSI vs Types of Surgery	No.of complications	Percentage
Adhesiolysis (6)	2	18.2
Appendicectomy (20)	1	9.1
Diagnostic Laparoscopy (6)	1	9.1
Lap APR (6)	1	9.1
Lap Cholecystectomy (45)	6	54.5
Total	11	100.0

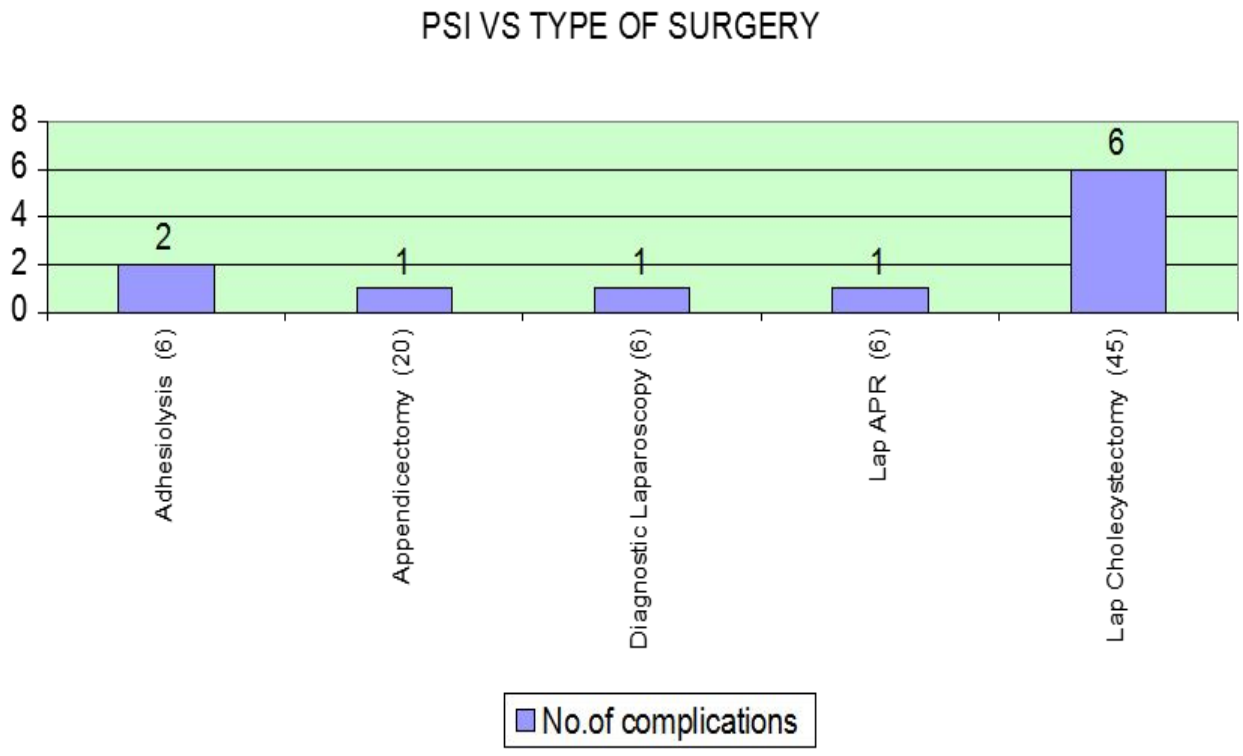


Fig:Port site complication in different surgery

Tab:7 Port site infection in relation to use or not used of retrieval bag

PSI vs No Retrieval Bag	No.of complications	Percentage
Yes	1	9.1
No	10	90.9
Total	11	100.0
P VALUE	0.001 significant	

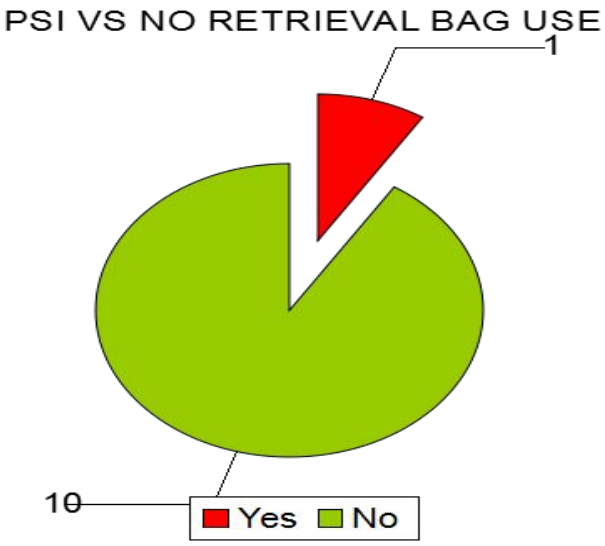


Fig:Port site infection in relation to use or not used of retrieval bag

Tab:8 Port site infection in relation to Port types

PSI vs Port Type	No.of complications	Percentage
Epigastric port	2	18.2
Umbilical port	9	81.8
Total	11	100.0

P VALUE 0.011 significant

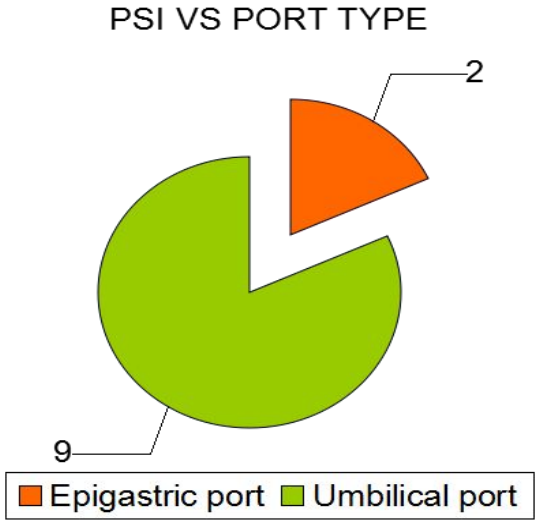


Fig:Port site infection in relation to Port types

Tab:9 Port site infection in relation to method of access

PSI vs Access Technique	No.of complications	Percentage
Open	9	81.8
Close	2	18.2
Total	11	100.0
P VALUE	0.011 significant	

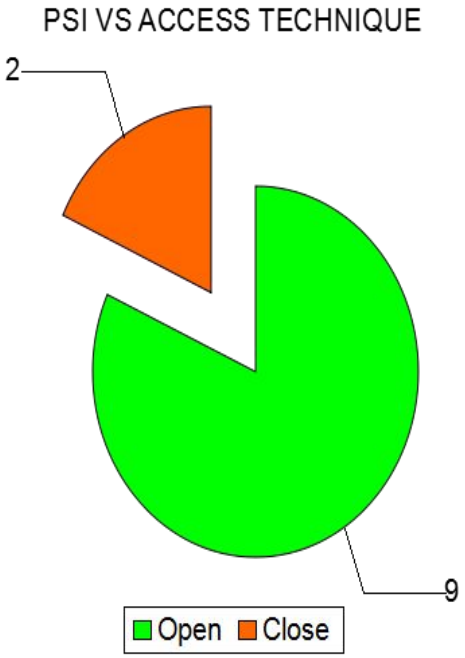
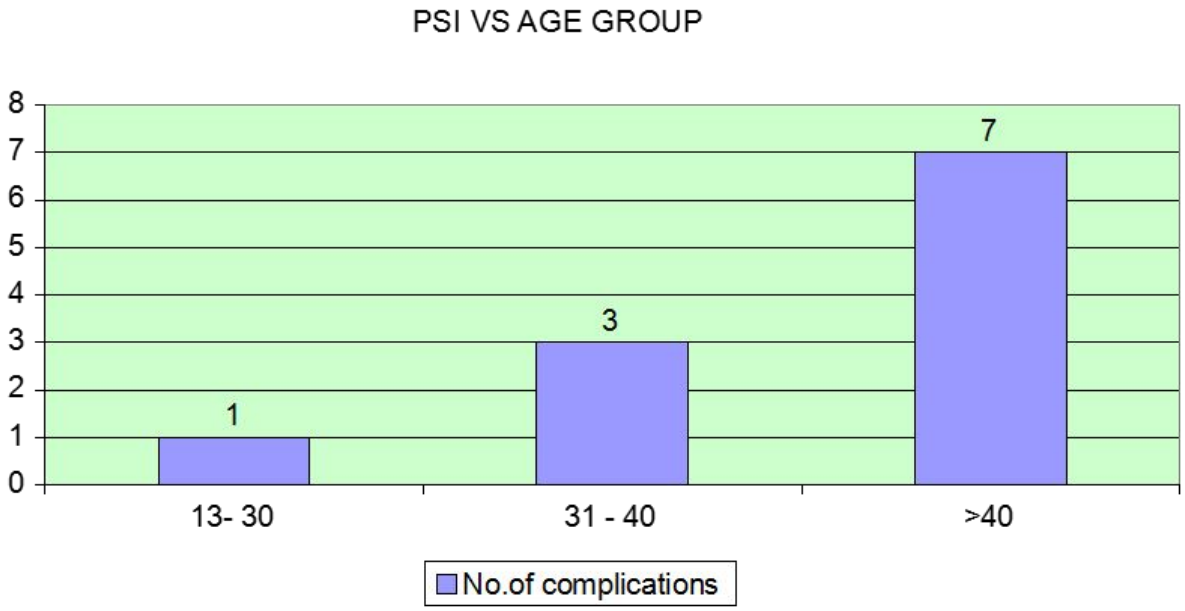


Fig:Port site infection in relation to method of access

Tab:9 Port site infection in different age group

PSI vs Elder Group of Age	No.of complications	Percentage
13- 30	1	9.1
31 - 40	3	27.3
>40	7	63.6
Total	11	100.0
P VALUE	0.022 significant	



Tab:10 Port site discharge in relation to access technique

PSD vs access technique	No.of complications	Percentage
Open	11	78.6
Close	3	21.4
Total	14	100.0
P VALUE	0.008 significant	

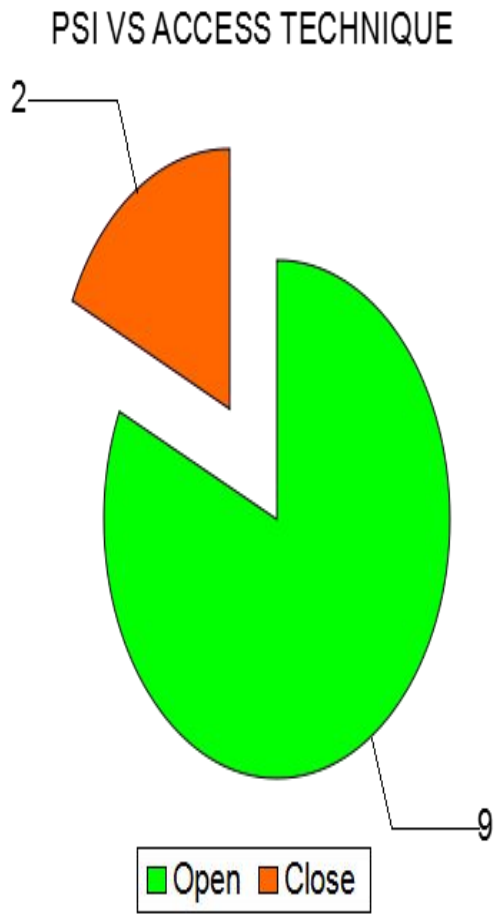


Fig:Port site discharge in relation to access technique

Tab:11 Port site discharge in relation to port size

PSD vs Port size	No.of complications	Percentage
Large	11	78.6
Small	3	21.4
Total	14	100.0

P VALUE 0.008 significant

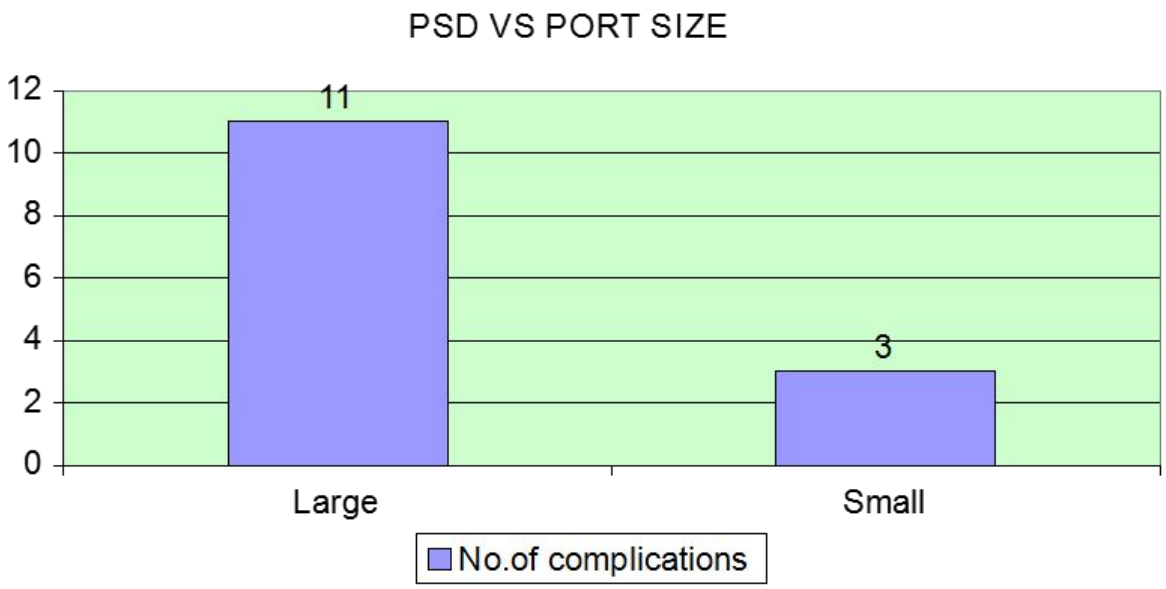


Fig:Port site discharge in relation to port size

Tab:12 Port site discharge in relation to BMI

PSD vs BMI	No.of complications	Percentage
> 25	11	78.6
< 25	3	21.4
Total	14	100.0
P VALUE	0.008 significant	

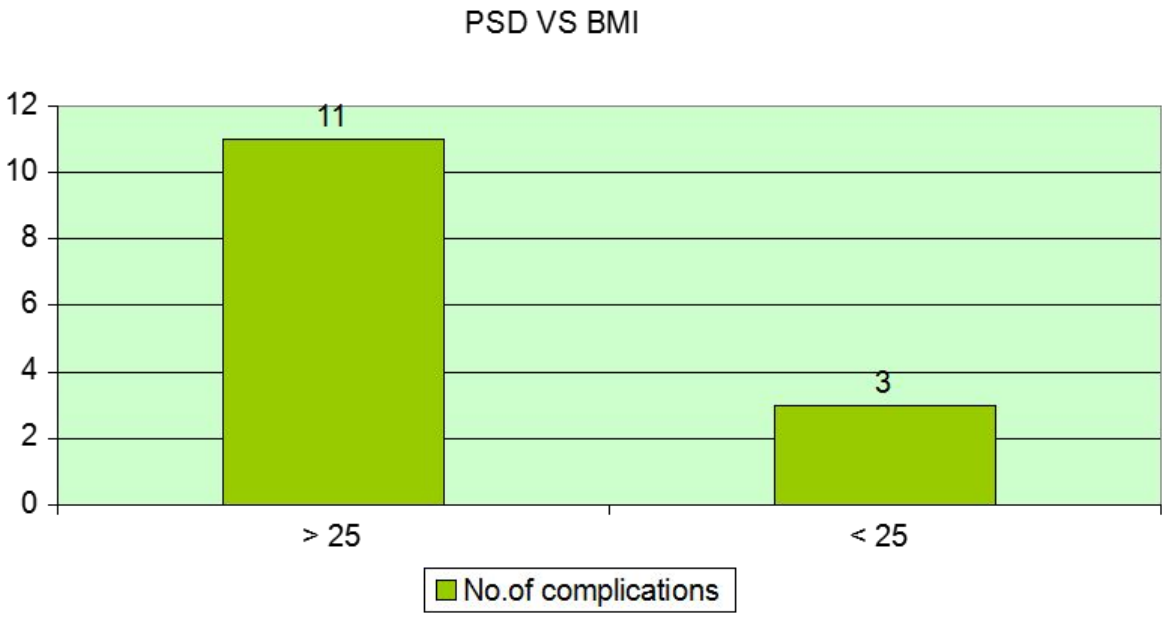


Fig:Port site discharge in relation to BMI

Tab:13 Port site hernia in relation to port size

PI Hernia VS Port size	No.of complications	Percentage
Small (<10mm)	1	16.7
Large(>10mm)	5	83.3
Total	6	100.0
P VALUE	0.206 Not sig	

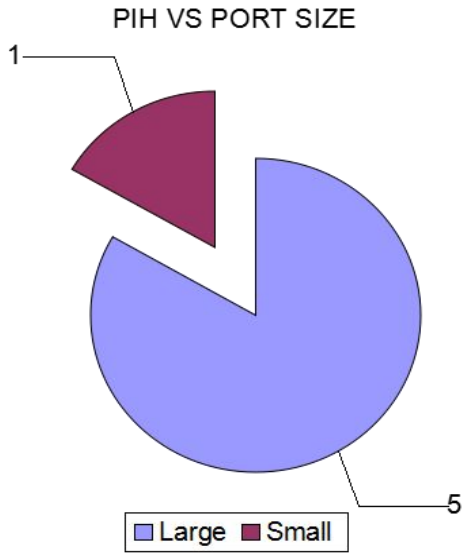


Fig:Port site hernia in relation to port size

Tab:14 Port site hernia in different age group

PI Hernia VS Age group	No.of complications	Percentage
13- 30	1	16.7
31 - 40	1	16.7
>40	4	66.7
Total	6	100.0
P VALUE	0.105 Not sig	

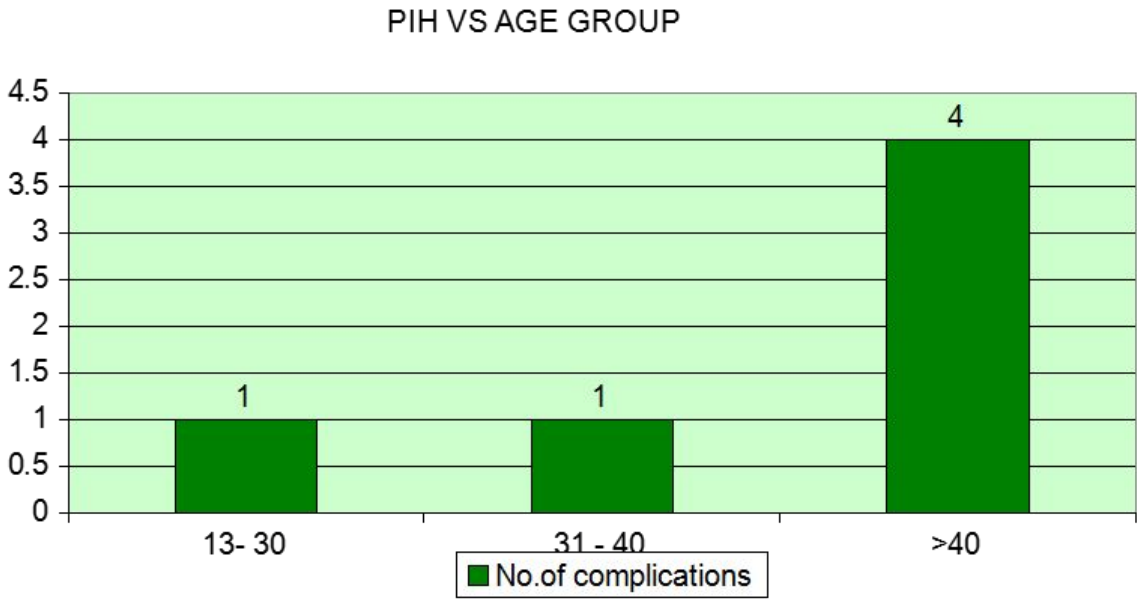


Fig:Port site hernia in different age group

Tab:15 Port site metastasis in relation to Specimen bag usage

Port site metastasis vs Not use retrieval bag	No.of complications	Percentage
Yes	4	100.0
No	0	0.0
Total	4	100.0
P value	0.029 Significant	

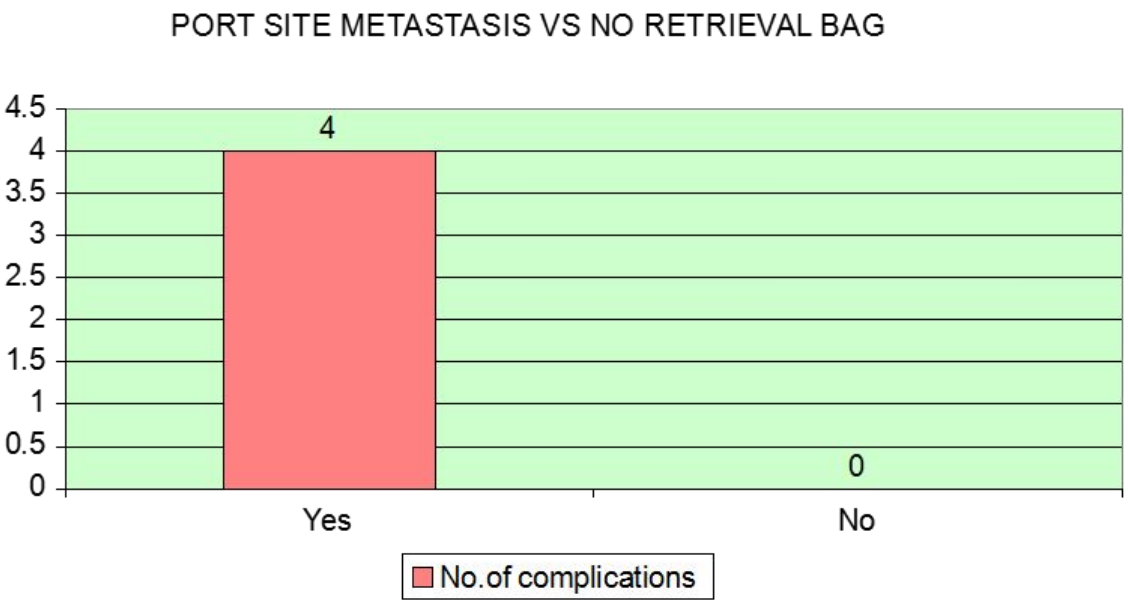


Fig:Port site metastasis in relation to Specimen bag usage

Tab:16 Port site metastasis in relation to different types of port

Port site metastasis vs Port type	No.of complications	Percentage
Epigastric port	4	100.0
Umbilical port	0	0.0
Total	4	100.0
P value	0.029 Significant	

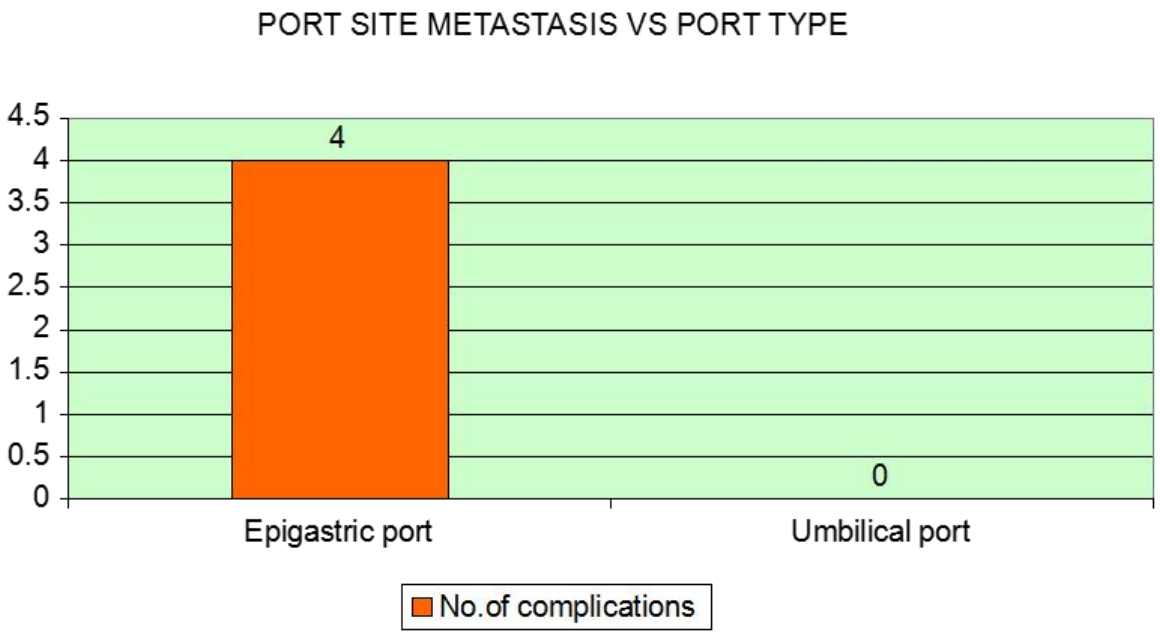


Fig:Port site metastasis in relation to different types of port

DISCUSSION

Port site complications can be grouped into access-related complications and postoperative complications, and have been reported in all age groups and in both genders. The literature shows that obesity is associated with increased morbidity related to port site due to various factors like the need for longer trocars, thick abdominal wall, need for larger skin incision to expose fascia adequately, and limitation in mobility of the instrument due to increased subcutaneous tissue. Care must be taken during placement of trocars to align their axes as needed for the procedure.In my study,there was increased in the frequency of morbidity related to port site and obesity.Patients with more BMI has more port site complications in relation to those with normal BMI.

In this study that Lap cholecystectomy was the commonest procedure performed and more frequently associated with port site complications. This is comparable to observations made by Fuller *et al* .Neudecker *et al*. had shown that port site complications were increased with more number of ports. Fascial closure is recommended for ports ≥10 mm; the fascia are closed with sutures to reduce the risk of developing a port site hernia. Re approximation of the fascia can be accomplished in a variety of ways. Ideally, the fascia is directly visualised with the aid of retractors. The fascial edges are grasped and the sutured closed with interrupted or continuous suture.

A number of specialized instruments have been devised for fascial closure at the port site (e.g., Grice suture needle, Carter-Thomson needle-point suture passer, Endo Close instrument, Reverdin suture needle).The benefit of these devices is yet to be

proven. The technique of closure of the rectus sheath had no influence on my study.

PORT SITE DISCHARGE/INFECTION:

Laparoscopic procedures have a reduced incidence of PSIs and other wound-related complications.Nonetheless, they can produce significant morbidity. The presence of significant peri-incisional erythema, wound drainage, and fever may indicate the presence of a necrotizing fascial infection. The incidence of PSI was 11%.These results are comparable with many other studies. Den Hoed *et al*. Found the incidence to be 5.3% Shindholimath *et al*. 6.3% All PSIs were superficial, involving only the skin and subcutaneous tissue. Superficial skin infection is more common and has been reported by another study.

Umbilical port site was the most common site of PSI followed by epigastric port site. In the literature, there is great emphasis on the increased frequency of umbilical site PSIs and the role of umbilical flora in the development of PSIs. Emphasis is also there on the increased frequency of PSI and the trocar site of extraction. All gall bladder specimens in cholecystectomy were removed through the epigastric port without the use of specimen bag so there is higher incidence of infection compare to usage of specimen bag.

Wound infections are prevented by appropriate administration of antibiotic

prophylaxis, sterile techniques, and the use of specimen bags during specimen extraction.Once present, infections are treated with proper cleaning and dressing, and antibiotics according to culture and sensitivity testing.

PORT SITE BLEEDING:

Incidence of port site bleeding was found to be 5%. Our results are comparable with other studies.All were associated with the placement of secondary trocars. There was no associated bleeding with port site dilatation for specimen removal. Injury to epigastric vessels can be related to carelessness during the operative procedure usually during the placement of secondary trocars (<10mm size port) which should be placed under direct vision and with prior illumination of the abdominal wall. Bleeding from the abdominal wall may not become apparent until after the port is removed because the port may tamponade muscular or subcutaneous bleeding. In addition to visually inspecting the access site upon its creation, the site should also be inspected during and following removal of the port. Bleeding points can usually be identified and managed with electrocautery. On occasion, the skin incision may need to be enlarged to control the bleeding. If persistent bleeding continues, a Foley catheter can also be inserted, inflated, and gentle traction applied to tamponade the site.

Also, U-stitches can be placed into the abdominal wall under direct laparoscopic

visualization using a suture passer with absorbable braided sutures. A number of specialized instruments have been devised for fascial closure at the port site and these may also be useful for managing abdominal wall bleeding.

OMENTUM RELATED COMPLICATIONS(ENTRAPMENT/PENETRATING INJURY)

In this study there was no incidence of omental related complications.Various factors are attributed to the occurrence of these complications including

a) removal of the ports prior to complete deflation of the peritoneal cavity,

b) inadequate/faulty closure of the port site incisions, and

c) large incision at the port site.

They can be avoided or managed as follows:

a) After the procedure, all the ports should be removed under careful vision,

b) All the accessory ports to be removed under vision followed by the releasing pneumoperitoneum by opening the valve of 10 mm cannulas,

c) After release of gas is completed, the primary port and telescope are to be

removed together,with a clear view at all times that the port is free of any entrapped bowel,

d) To limit the size of the port incisions, and

e) A secure and adequate closure of the port sites of size 10 mm and above should be ensured.

PORT SITE INCISION HERNIA:

The incidence of port site incisional hernia in this study was 6%.This complication was found more in old age group,large port and in whome Hasson's technique was used.There is also higher incidence of PIH among patients who had infections in postoperative period. The risk of developing incisional hernia is low with the use of trocars ≤12 mm, radially dilating trocars, or bladeless trocars. Most authors close fascial defects if a port >12 mm is used regardless of site or type of trocar. Some advocate closure if >10 mm in size.The fascia should be closed with suture to reduce the risk of developing a port-site hernia.Although rare, hernia has been reported even for 5 mm trocar sites. When port site hernia is identified following laparoscopy,the site should be repaired to prevent the development of intestinal complications (i.e., obstruction, strangulation).

PORT SITE METASTASIS:

The incidence of port site metastasis in this study was 4% and was found more in those cases where specimen retrieval bag was not used at the time of time of retrieval.

In recent years some studies have reported the incidence of metastasis at port site after laparoscopic oncological procedures,The exact mechanism of development of metastasis of the abdominal wall is unknown. However, various explanations are given in the literature.Studies show that recurrence of tumour at the port site probably can be avoided by the use of plastic bags or wound protectors to avoid direct contact between the tumour and the wound. It is also essential that extraction of the specimen is done through an abdominal incision wide enough to allow easy passage of the specimen.

CONCLUSION

This is an prospective study to analyse the morbidity associted with port site in laparoscopic surgeries(Basic and advanced) both elective and emergencies,to determine the risk factors of the complications and their management.The study population consist of 100 and was carried out over one year of period.Complications encountered at port site were discharge,infection,bleeding,port site hernia and metastasis with discharge and infection being most common.

These complications were more in patient where following factors were present:

1.Open or Hasson's method of access

2.Larger port size

3.Old age group

4.Increased BMI

5.Not used of specimen retrieval bag.

The commonest intraoperative complications were seen in secondary ports, though overall complications were more at the umbilical port. Percentage wise, the incidence of these complications noted in the study is comparable with statistics worldwide.All complications were manageable with minimum morbidity. Consideration of meticulous surgical technique during entry and exit at all the port sites can minimize these complications further

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ANNEXURE

KEYS TO MASTER CHART

TOS-Types of surgery

UOB-Use of retrieval bag

PS-Port size

PT-Port type

BMI-Basal metabolic rate

PSI-Port site infection

PSD-Port site discharge

PIH-Port incisionsl hernia

PSM-Port site metastasis

O/Cx-Omental related complications

O-Open technique C-Close technique SSE-Subcutaneous emphysema

Y-Yes N-No E-Epigastric port U-Umbilical port

S-Smaller size port(<10mm) L-Large size port(>10mm)

Cx-Complication

URKUND

Urkund Analysis Result

Analysed Document:	Prospective study on port site complications in laparoscopic surgeries in grh,madurai.docx (D31139025)
Submitted:	10/9/2017 10:59:00 AM
Submitted By:	varneikip08@gmail.com
Significance:	0 %

Sources included in the report:

Instances where selected sources appear:

0

CERTIFICATE-II

This is to certify that this dissertation work title "**PROSPECTIVE STUDY ON PORT SITE COMPLICATIONS IN LAPAROSCOPIC SURGERIES IN GRH, MADURAI"** of the candidate **DR.T.D.VARNEIKIP CHIRU** with registration number **221511120** for the award of **M.S.Degree** in the branch of **GENERAL SURGERY.**

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ETHICS COMMITTEE CERTIFICATE

Name of the Candidate	:	Dr.T.D.Varneikip chiru
Course	:	PG in MS., General Surgery
Period of Study	:	2015-2018
College	:	MADURAI MEDICAL COLLEGE
Research Topic	:	Prospective study on port site complications in laparoscopic surgeries in GRH, Madurai
Ethical Committee as on	:	02.06.2017

The Ethics Committee, Madurai Medical College has decided to inform that your Research proposal is accepted.

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Prof Dr V Nagaraajan
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